THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

OLD SERIES
VOL. 13, NO. 1.

NEW YORK, JANUARY, 1907.

NEW SERIES
VOL. 5, NO. 1.

LAKE COPPER VERSUS ELECTROLYTIC.

By ANDREW M. FAIRLIE.*

I. INTRODUCTION.

Buyers and sellers of copper in England are accustomed to the terms "best selected," "tough cake," "tile," and "good merchantable brands." In the United States copper is variously described—with, however, no reference to the English classification—as "lake," "electrolytic," and "casting." In the metal market these American grades nearly always vary in price, with lake copper leading in value, and casting copper lowest. Casting copper, as the name implies, is metal fit only for making castings. Its unfitness for other purposes is due to the impurities it contains, and obviously metal so restricted in its uses could not be expected to bring as high a price as metal useful also for rolling into sheet and for wire-drawing. Lake and electrolytic copper are both useful for all three purposes, and inquiry into the relative prices of these grades discloses a peculiar condition. The following table, compiled from reports published in the *Engineering and Mining Journal*, gives the average monthly price, in cents per pound of lake and electrolytic copper for the years 1904, 1905, and 1906.

	—1904—		—1905—		—1906—	
Month.	Lake.	Electro-lytic.	Lake.	Electro-lytic.	Lake.	Electro-lytic.
Jan.	12.553	12.410	15.128	15.008	18.419	18.310
Feb.	12.245	12.063	15.136	15.011	18.116	17.869
March ...	12.551	12.299	15.250	15.125	18.641	18.361
April	13.120	12.923	15.045	14.920	16.688	18.375
May	13.000	12.758	14.820	14.627	18.724	18.457
June	12,399	12.269	14.813	14.673	18.719	18.442
July	12.505	12.380	15.005	14.888	18.585	18.190
Aug.	12.468	12.343	15.725	15.664	18.706	18.380
Sept.	12.620	12.495	15.978	15.965	19.328	19.033
Oct.	13.118	12.993	16.332	16.279	21.722	21.203
Nov.	14.456	14.284	16.758	16.599	22.398	21.833
Dec.	14.849	14.661	18.398	18.328	22.350	22.885
Year...	12.990	12.823	15.699	15.590	19.533	19.278

Inspection of this table reveals that in every instance the monthly average price for electrolytic copper was lower than that for lake, although in September, 1905, the average discount suffered by electrolytic was only a little more than one-hundredth of a cent per pound. As an offset to this close approximation to equality in average price, in October, 1906, there was an average difference of over half a cent per pound in favor of lake copper. Although all the average prices quoted show lake copper at a premium, there are times, as in January, 1906, when the daily quotations for electrolytic and lake are the same. But these times are rare, and the monthly averages tell the true story. Electrolytic copper, in value, is second to lake, and the reason for the depreciation is not so clear as in the case of casting copper.

To produce this inequality in price, this distinction in name, there must be some difference, in origin, method of production, or properties, between lake copper and electrolytic. Since no difference in properties is palpable to the casual observer, these inquiries naturally arise: how and where do these two varieties of copper originate, and by what methods are they produced? To answer fully and completely would require expositions of the mineralogy, chemistry, and metallurgy of copper—subjects on which large volumes have been written. It will be possible in these columns merely to outline in the briefest way the sources of North American copper, and the methods of smelting and refining it. It is not the purpose here to supply new facts to the specialist, or original ideas to the experienced metallurgist; but the information given, condensed as it is, will, it is hoped, be of interest to the consumer of copper—to the manufacturer, the roller, the caster, and other workers in the metal—and, it may be, the reader who follows to the end will be assisted in forming his own personal opinion regarding the reason for the disparity in price favorable to lake copper.

II. PRINCIPAL SOURCES OF NORTH AMERICAN COPPER.

At Buffalo, N. Y., the Calumet and Hecla Mining Co. maintains an electrolytic plant known as the Buffalo Smelting Works, and there copper-bearing material from the Lake Superior copper district (the source of all lake copper) is electrolytically treated for the sake of recovering the silver or for removing the arsenic contained in the mineral. This is an example of copper, lake by origin, converted into electrolytic copper, and known thenceforth as such. With the exception of electrolytic copper made in this way, all electrolytic copper is originally derived from ores, while all lake copper is found in the first instance in native form. An ore is a chemical combination, as found in the earth's crust, of some metallic element with certain other elements, usually non-metallic, of which the most important are oxygen, carbon, and sulphur. Since the copper found in the unstamped rock of the Lake Superior copper mines exists as the single element copper, not chemically combined with anything, the rock cannot properly be called an ore. Ores of copper have been found in the

*Chemist, Tennessee Copper Company, Copper Hill, Polk County, Tenn.

lake district, it is true, but all of the large producers mine the native metal.

The most common ore of copper is chalcopyrite, a yellow compound of copper, sulphur and iron, with a brassy luster. Other ores frequently encountered are azurite, a blue carbonate of copper; bornite, a purple compound of copper, sulphur and iron; melaconite and cuprite, oxides of copper; chalcocite, or "copper glance," the richest sulphide ore; and malachite, the green carbonate of copper. In the lake copper district, the two varieties of copper-bearing rock are called respectively amygdaloid and conglomerate. Amygdaloid is a rock of igneous origin—that is, formed by the cooling of fused magma ejected by volcanic action or forced into cracks and crevices in the earth's crust—and it takes its name from the small amygdules (from the Greek word meaning almond, indicating their shape) of softer material found in the rock. Conglomerate is a "pudding-stone" rock, made up of pebbles imbedded in ancient sea-beds.

(To be Continued.)

COPPER LEADS IN VALUE.

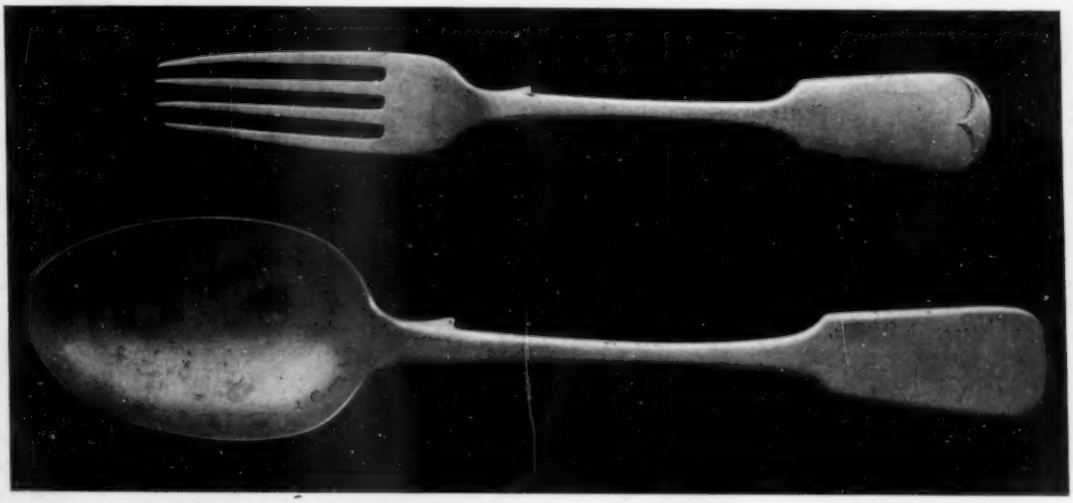
The value of the gold and silver production of the United States is of minor importance when compared with that of copper. Another peculiarity of copper, which we learn from the Copper Handbook for 1906, is that it carries such a surprisingly large percentage of the gold and silver output of the country as a by-product of the mines. The vast and rapidly increasing value of the copper output of the United States, which makes more than half of the copper produced in the world, is a most significant development. At the present price of the metal the copper mines of the world are mining at the rate of exactly $1,000,000 per day for every day in the year.

MAP OF THE PRINCIPAL COPPER PRODUCING CENTERS OF UNITED STATES AND MEXICO.

THE MANUFACTURE OF GERMAN SILVER FOR FLAT WARE.

By Thomas Clare.

In making German silver for spoons and forks, in fact all flat ware which gets any rough usage, it is necessary to make a good, hard, stiff, and durable metal. At the same time this metal, when annealed must be pliable and soft so that it may be struck up in a die both for ornamentation and for the formation of the article. Take, for instance, a fork. Very often a very deep ornament is stamped on the handle with a drop hammer. After leaving the hammer it must stand stiff and strong as a piece of steel. If the mixture of the metal is not right the prongs of the fork will wear away. If the mixture is made according to the right formula the prongs will wear evenly so that when the silver plate is worn off in places the fork may be replated two or three times before being cast aside as worn out.



GERMAN SILVER SPOON AND FORK.

In making the metal the best material is an absolute necessity. I should recommend pure bertha zinc or the golden rod brand, lake copper and the best nickel to be bought. The formula is as follows:

Nickel	18	lbs.
Copper	60	"
Zinc	22	"

This is the best mixture for flat ware for hotels, restaurants, etc., for forks, spoons and the like. It is a good, strong white metal. If the metal is required for hollow ware the proportions would have to be altered somewhat, since the frequent annealings necessary would bring the cost too high.

To make this metal (that is cast it) you must have the right kind of furnace with a good draft, as it takes a very high temperature to melt the nickel. The kind of furnace I have mentioned in a previous article on "Casting German Silver for Rolling" in The Metal Industry for August, 1905. First you place the crucible in the center of the furnace, taking care to have an equal amount of fuel all around it. Then have a good layer of pulverized charcoal in the bottom of the pot. When the crucible is red hot—not before—place in the copper and nickel, together with some borax—when this is melted put in the spelter, keeping the surface covered with charcoal, and when hot enough pour into flat iron molds.

The molds are in two pieces held together with iron clips and wedges; but before coupling the molds dress them with oil. When pouring, you must keep a continuous and steady stream or the metal will come dirty and "shutty"—that is, there will be round pieces of dead metal all along the edges of the strip and it will cause cracks in the rolling.

Before rolling, the metal should be very carefully inspected, for should there by any chance be a piece of dead metal, or any kind of dirt, such as a piece of charcoal, or a shutty place in the strip or plate, it should be removed with a round-nose chisel. In breaking down German silver a draught sufficient to keep straight while passing through the rolls should be given and the man behind the rolls should hold himself in readiness to keep the piece down as it comes toward him, as it is much easier to handle when kept straight. It should also be kept perfectly free from grease. It is a good plan to run a few pieces through the rolls to dry them off in good shape. This is only necessary where the breaking down rolls have to be used as finishing rolls also, which is the custom in most private firms.

The metal must be rolled down enough to close the grain. If this is not done the metal will crack in the fire and will have to be cut up and remelted. After the metal is annealed it is rolled again till the grain is closed and again annealed. This process is repeated until the strip is rolled down to the required thickness. It is then annealed, pickled, washed, scoured, rinsed in clean water and dried in sawdust. It is then ready to be cut up into the required lengths, annealed and cross-rolled on graded rolls and cut into blanks. (Additional information on this subject may be found in the article on "Fire Cracks in German Silver" in The Metal Industry of March, 1905.)

I have always claimed that the most economical way to cut the metal for spoons and forks is to have your metal rolled wide enough so that you can cut the blanks crosswise instead of slitting the sheet up into strips about ⅞ or 1 inch in width as the case may be. I think this way of cutting would save time and metal, as the strip would be the length of the fork and the blank would be ready for cross rolling.

Then the fork blanks are taken to the press where the prongs are formed by cutting out the metal between. The prongs are then stamped under a drop, making them quite stiff and strong. They are then trimmed on an emery belt and bent into shape in a press.

AUTOMATIC CONVEYING IN PLATING OPERATIONS.

By W. L. Churchill.

The advantages of imparting motion to suspended work, while in the process of electro-plating, are not as universally understood and availed of, as the merits of the method, and the comparative simplicity of its application to most lines would warrant. It is the purpose of this article to mention some of the chief advantages of the method, and to touch on a few of the devices that have been evolved to accomplish this object.

Aside from the economy of mechanically handling work in the various operations involved in electro plating, for which purpose several very complete and ingenious outfits have been built, there are several important advantages to the plating process itself, not only for silver depositing which has utilized motion from the first as essential to a uniform deposit—but for the commoner nickel, copper, bronze and other alloys. It is possible by this method to maintain perfect contact at all times between the suspending wire or hooks, and the cathode current rod, as it is now the usual practice to have the latter stationary, and allow the slinging wires, hooks, etc., to slide or rub along its surface, which friction keeps the points of contact always bright and clean without other attention. This feature in itself is of decided value in many plants, where much work has to be refinished—owing to plate being cut through by buffers—which is usually caused by lack of uniformity of thickness of the deposit, due to varying degrees of current contact unavoidable in stationary suspension, except by an amount of care and attention that busy platers are unable or unwilling to bestow. There are instances where the saving effected on this item only more than offsets the cost of installing automatic plating devices, without considering the gain in assurance of prompt deliveries.

The conveying of the work past every anode of a tank, as is done with most of these automatic devices, insures uniform exposure to anode surface, of all work handled, thus eliminating the lack of uniformity of thickness, or color of deposit due to uneven distribution of anode surface in the tank. Some of our most successful brass and bronze platers are able to maintain a uniformity of color and quality of alloy deposits by this method that renders results as certain and continuous as with the ordinary nickel plating by stationary suspension. For electro galvanizing work in which it is important to be able to guarantee a uniform deposit this method is ideal.

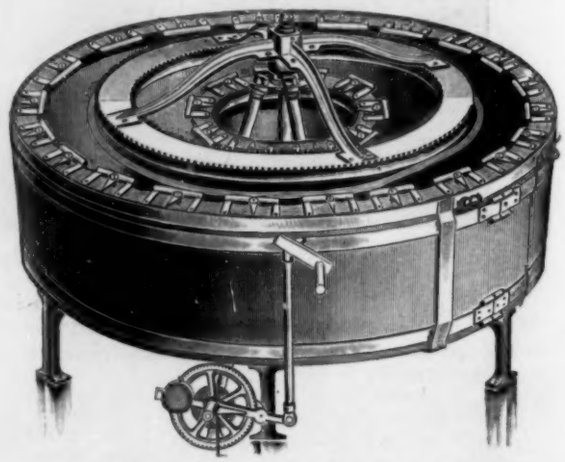
Imparting motion to the work while plating, also has a swilling effect, especially where the intermittent movement is used; this tends to remove hydrogen bubbles, as well as to rinse off clinging particles of cleaning substances, etc., and materially assists the cleaning operation. This is quite noticeable where both stationary and moving methods are employed. As is well known, experienced cleaners get so they clean as little as possible, to avoid stripping or peeling of the plate, and it frequently happens that an operator accustomed to cleaning work for a tank with a conveying attachment, if suddenly forced to use stationary suspension, will lose a large proportion of his work, from improper cleaning, indicating that work which is to be moved through a solution while plating requires less care in its preparation and can therefore be handled faster and cheaper than for stationary plating.

An increased speed can also be obtained as a higher voltage may be used without danger of burning.

For solutions such as the acid copper, that requires constant agitation, no better or more logical method could be devised than that of moving the work in same; and yet with solutions having a large amount of sediment that makes agitation undesirable, the motion imparted can be so smooth and regular as not to disturb same.

Some experiments have been conducted with a view of securing a bright nickel deposit, that would not require buffing, by imparting swift motion to the work while plating—(especially practicable with the circular suspended conveyor, or the circuit chain conveyor)—these experiments although showing an improved apearance have not proven all that was desired, but indicate possibilities worthy of further investigation.

The most conspicuous advantage to manufacturers, of this method of plating is the possible economy of labor, equipment, and space, and since it has become possible to obtain shop rights to use the fundamental patents relating to these processes, and engineers have turned their attention to developing the mechanical



CIRCULAR FRAME PLATING TANK.

possibilities to meet individual requirements, a number of highly successful outfits have been evolved, some of them quite elaborate and performing all the operations involved in the plating process, and requiring the attendants to merely secure and remove the work handled; others perform but a part of the operations.

The simplest form is the well known circular type of tank having a circular frame suspended over the cathode rods and revolved by means of the upright shaft on which it is secured, by means of a worm gear ratchet and pawl, and pitman at any required speed. In this tank the work is suspended from the revolving frame which is placed in such a position over the cathode rod that the suspending wires or hooks are always in frictional contact with it. This is essentially a one man tank; the operator cleans and rinses his work, hangs it on the revolving frame in the solution, while he remains in one location, saving the time and exertion of walking and carrying his work from sinks to tanks, etc. When the frame is once filled, he

removes the work as fast as it reaches his location, and replaces with other work. Thus he is cleaning, rinsing and drying work continuously, and every piece has the same length of exposure to the action of the current, and as there is no occasion for prepared work to remain in water a long time, waiting for a tank to be emptied, the ideal plating condition of prompt immersion in solution, after cleaning, is automatically provided for. These tanks are usually built 8 to 10 feet outside diameter. A 9-foot tank has a lineal cathode capacity of about 40 feet, or equal to 5 single rodded 8-foot oblong tanks.

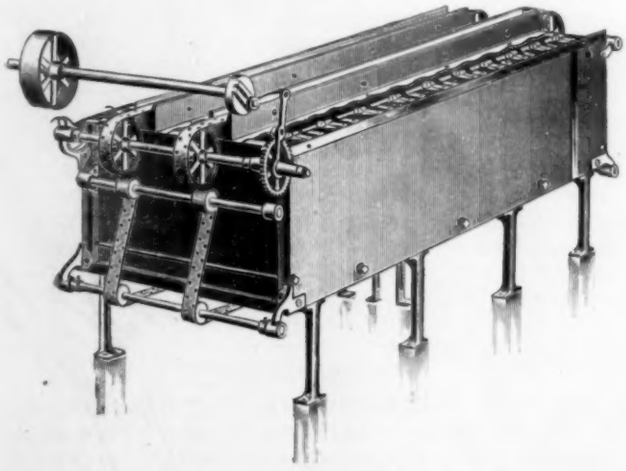
For standard work that is slung on wires or suspended from single hooks or narrow racks or frames, and in quantity to keep a single operator only, employed, this device meets most requirements. On classes of work requiring long submersion, one operator can readily handle two of these tanks at once, and some very interesting records for quantity of work in a day, have been made in this manner. The shape of this tank imposes some limitations on its use, as very long work, that would need to hang lengthwise of cathode bar, could not be suspended in it without coming in too close contact with anodes on the ends or center. This shape of tank is readily made of either wood or metal, and involves no difficulties in maintenance not met with in other shapes, although the circular wooden tank requires considerable skill to set up properly. A substitution for this tank is sometimes made by using a pair of sprocket wheels placed horizontally over either end of an oblong tank, and connected with a sprocket chain, which is used to convey the work lengthwise of the tank around the end of the center row of anodes, and back on the other side. This arrangement has the advantage of being readily applied to any tank, already in use, that is wide enough for three rows of anodes, also that where a variety of work is handled it is possible to plate long articles hung lengthwise of the tank, by using it stationary, instead of moving, as occasion may require. By placing several of these tanks side by side and working from the ends some economy in space can be secured over the round tank, and where varying lengths of deposit are required, by having several small units set at different speeds, this condition can be more readily met than with a single larger outfit; it also allows of several different kinds of deposits to be handled by one operator, with the same economy as would be possible in handling large solution.

Another arrangement made with standard oblong tanks is to run one or more sprocket chains or perforated belts lengthwise of tanks and returning under same. This method requires an operator at either end of tank, one to insert the work at one end, and the other to remove same from opposite end; where the quantity of work is sufficient, and the deposit can be made fast enough to keep two attendants busy, this is a very economical system, and although not as complete as some entirely automatic devices, is much in favor, and in plants where the conditions are such as to prohibit the latter, nearly as great an economy can be effected by its use.

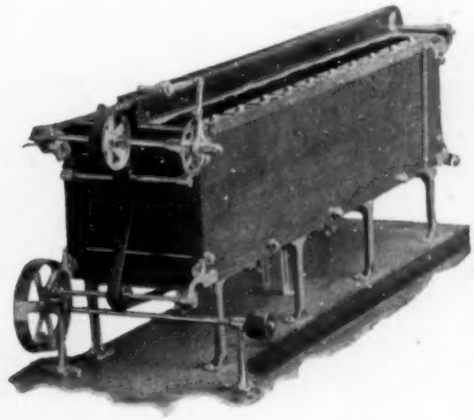
An elaboration on this latter method is that of returning the chain back over the tank by means of vertical sprocket wheels which, if set at a slight angle, enable the work to be lifted from the solution and returned by means of the same chains, thus allowing one operator to handle same. Its only advantage over the horizontally arranged chain conveyor is that the work is automatically removed from the solution, and that more than two rows of work can be plating in a single tank. Where the plating is done periodically, the plater, after placing all the work at hand in his tank, can leave same and go about other duties; as when all the work is plated it will be suspended on the upper row of chains over the solution, and can be removed at will.

This method of returning conveyor is also used on a type of tank using anodes hung crosswise on rods, with alternating rods carrying the work; this is useful in specific instances, but not of general value, as a double supply of anodes must be kept in use, and the distance from anodes to work be sufficient to allow of the revolution that takes place on the sprocket wheels.

(To be Continued.)



CARRYING BELTS ABOVE AND BELOW TANK.



LONG PLATING TANK.

A shipment of belts and belt buckles composed partly of silver was received at New York in December and was assessed by the custom authorities as jewelry and subject to a duty of 60 per cent of their value. The importers appealed the decision on the ground that the articles were useful productions of metal, but were not jewelry and therefore should be classed at 45 per cent. It has just been decided by three general appraisers that belts, when composed of precious stones or precious metals, are intended as adornments and hence are jewelry.

SILVER DEPOSIT ON GLASS AND PORCELAIN.

By Joseph Dimes.

There are numerous processes for the deposition of silver on glass and porcelain, but one of the most practical and successful ways of producing a deposit which will adhere firmly to the body is as follows:

Take one ounce of fine silver and dissolve it in equal parts of nitric acid and water; when the silver has been all dissolved add one gallon of clean cold water and filter the solution so as to have it perfectly clean and free from all undissolved matter. The clear solution of nitrate of silver is then placed in a jar and some strips of clean copper wire are suspended in the solution; this will precipitate the silver in a metallic powder. This operation is best produced in the dark. After the silver is all precipitated—and this can be ascertained by removing a small quantity of the solution and testing with muriatic acid; if no chloride is thrown down then there is no more silver in the nitrate solution and it can be thrown away—pour off the liquid and wash the silver powder clean. Put the powder in a lead pot and cover it with hydrofluoric acid and let it stand for three or four hours. This will remove all organic matter which may be in the silver. It is now washed clean and free from acid again and placed on a clean plate and dried over a very slow fire, care being taken not to heat the powder too much. When thoroughly dry it is ground in water in a mill or

SILVER DEPOSIT WORK OF THE ELECTROLYTIC ART METAL COMPANY.

with a muller on a tile so as to get as fine as possible; the finer the powder the better the paint will be. It is now allowed to dry and when free from water is ground again in turpentine and dried.

The following proportions are made:

Silver powder.....1 oz.
Red oxide mercury..... 1 dwt.

This mixture is well mixed by grinding in turpentine; it is then mixed with Dresden fat oil and turpentine and is ready for use.

It is now painted on the article to be treated as smoothly as possible and placed in a kiln to be fired. The writer would not advise jumping too rapidly into the process as it requires great care and accurate proportions to produce results, and there are no two glass manufacturers' goods that will stand the same heat. As for china, each color will require a different heat to be properly fired.

The writer has had a wide experience in silver depositing and perfers and advises the chloride of silver solution for deposit work. It deposits metal of a finer grain and more rapidly and smoothly than the cyanide of silver solution. The chloride of silver solution is made as follows: Take 8 ozs. of silver and reduce to a nitrate and precipitate in a chloride. After washing place in 1 gallon water and precipitate with chemically pure cyanide of potassium, adding just enough free potassium to make the solution work freely. This solution should run ¾ of a volt, and after one or two batches of work have been run through the work should come from the solution perfectly smooth.

The writer ran 5 100-gallon tanks night and day for two years, the tanks being filled with work twice in 24 hours, and the work when it came from the plating bath was given over to the buffer—no sand bobbing being necessary.

It would not be well to go too quickly into this or any other process; try it in a small way first and if successful you can easily increase; if not successful, the writer would be glad to give further advice.

PLATING WITHOUT A PLATING BATH.

A patent granted to Gilbert H. Thime, of Chicago, Ill., December 11, 1906, describes a compound for plating without the use of a bath. This consists of 3½ parts of powdered tin, powdered lead, 4½ parts, and 8 parts of mercury. These are triturated in a mortar to form an amalgam of a dry and friable nature. In some cases it has been found to be impossible to produce a dry friable amalgam from these ingredients, and in that case it has been necessary to add a proportion of ½ an ounce to about 8 pounds of the first compound. To 16 parts of the amalgam are added 3½ parts of sal-ammoniac, and the whole is triturated.

In the use of this compound for plating brass the article to be plated is first thoroughly cleaned, and the dry plating compound rubbed over the surface. Usually about three coats are necessary, the article being cleaned after each application of the compound. When properly applied it is clained that this method imparts a bright and durable coating to the brass. It may also be used for the plating of iron.

DIPPING ALUMINUM.

By Charles H. Proctor.

Aluminum cannot be bright dipped the same as copper, brass and bronze. The concentrated acids used for the dipping of those metals have no effect upon aluminum, only to reduce any oxide that may form upon its surface. The usual way of whitening aluminum consists of cleaning from oil and grease in benzine or gasoline, and then immersing for a few minutes in a hot solution, 5 to 10 per cent of caustic potash. The article is then washed and immersed in aluminum dipping baskets in yellow aqua fortis, 38°. The articles are well washed and dried in maple sawdust. This is the usual way followed by manufacturers of aluminum goods.

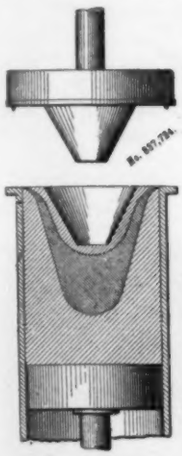
INTERNATIONAL EXPOSITION OF SAFETY DEVICES.

The first International Exposition of Safety Devices will be held at the American Museum of Natural History, New York City, from January 20 to February 12. The exhibits will include safety devices for wood and metal working machinery; stamping and grinding and polishing machines; safeguards for boilers, elevators, windlasses, cranes and hoisting machinery; textile and building trades, etc.

The Posno system of brazing aluminum depends upon the brazing composition. As soon as this has melted it is worked well into the joint between the parts to be soldered. Care should be taken that the heat is kept up and cold currents of air are avoided until the brazed joints cool down.

THE MANUFACTURE OF METALLURGICAL VESSELS.

Letters patent granted to Augustin L. J. Queneau, of South Bethlehem, Pa., and by him assigned to the New Jersey Zinc Company, of New York City, describe a new method of manufacturing retorts, crucibles and similar vessels wherein the walls are made up of composite layers, such as an outer layer of fire clay, graphite and sand and an interior layer of fire clay and sand. The main purpose of these outer layers is to protect the intermediate layer from the destructive pitting or corrosion incident to the use of so-called "graphite" crucibles when subjected to the direct action of flame. The vessel is first roughly formed in the "schlag" machine, which consists of a vertically operating plunger provided at its lower end with a wooden shoe. This plunger is raised by a lifting cam and permitted to drop by gravity, thereby imparting a blow to the "wad." The wad is supported upon a piston forming a movable bottom of a cylindrical casting and in which it is raised and lowered hydraulically. In this way a skilled workman can make composite wall vessels. The new invention provides means whereby the unskilled workman can make the same vessels. With the machine shown a number of pug mill cylinders of fire clay and sand are first hammered by means of the plunger shoe. Then similar pug mill balls of graphite, clay and sand are hammered into the first and finally other balls of fire clay and sand are hammered into the interior. The result is a composite vessel whose several layers are cup-shaped, the inner ones being nested within the outer.



PLUMBAGO SHIPMENTS.

Crucible manufacturers will be interested in the shipments of plumbago from the Island of Ceylon, and the following are some recent figures compiled by commercial journals of India: From January 1 to October 15, 1906, the shipments were 536,301 cwt. In the same period, 1905, the total was 481,719 cwt. Of this production America in 1906 took 230,442 cwt. and in 1905 190,507 cwt. The shipments to Great Britain and Germany for the same period showed the same relative increase. It will be noted from the above figures that the American consumption is nearly as much as that of the rest of the world. About every nation showed an increased consumption in 1906 over 1905, excepting Japan, which recorded a decrease. This is explained by the fact that Japan is developing its own graphite mines. However, samples of graphite from that country are of such inferior quality that American crucible manufacturers say they cannot use it.

MALAY TIN OUTPUT.

The output of all the tin bearing states of the Malay Peninsular for the first nine months of last year was 36,213 long tons against 37,869 tons for the same period of 1905. The shipments from the Straits Settlements for the first nine months of 1906 were 43,262 tons, or 7,049 tons more than the commissioner of mines reports as the output of the mines. This shows that there was a large amount of tin on hand, held back to control the market and take advantage of the higher prices which have prevailed during the past few months.

MANGANESE ZINC.

By A. E. Hobson.

Manganese zinc, a new alloy, is fast taking the place of manganese copper as a deoxidizing agent in the manufacture of brass, german silver, nickel silver, bronze and all cuprous alloys. The alloy manganese 15 and zinc 85 has been very successfully made and is now upon the market. The advantage of manganese zinc over manganese copper is that there is a greater affinity between manganese and zinc than there is between manganese and copper. The former is a perfect alloy, while the latter is at the best only a mixture. Manganese copper often carries small particles of iron and manganese in unmelted condition; these cause blisters in sheet metal and holes in castings. This trouble is entirely obviated by the use of maganese zinc. The use of manganese in alloys is now too well known to make it necessary to go into details. I will only say that long and careful investigations have brought forth the fact that a small quantity of manganese in an alloy will deoxidize the metal and cause it to be more ductile, tougher and freer from defects. I would advise the use of not more than 1 per cent and not less than ½ per cent of manganese, and the introduction of the manganese by the simple use of manganese zinc in the ordinary way that zinc is used. Add the proper quantity of the above zinc-manganese alloy to introduce the 1 per cent of manganese to the alloy. Several of the largest makers of german silver use this alloy and entirely discard manganese copper. Manganese tin should be used in making bronze and is also obtainable.

IMPROVEMENTS AT THE DETROIT MILLS.

The Detroit Copper & Brass Rolling Mills, Detroit, Mich., have moved into their new offices. The addition to their tube mill, 314 x 218 feet, is completed and occupied, which will confine their entire tube business to one roof in a building with a total length of 700 feet. Early in the year alterations and improvements will be finished in their copper mill, including the installation of a new 1,600 H. P. engine and a number of additional rolling mills, which the company believe will give them the largest copper rolling facilities in the United States. Early in 1907 they expect to have completed their newly constructed brass rod and wire mill, which will include considerable new machinery as well as a new 600 H. P. engine. Ground will be broken early this year for the new copper rod mill equipment for which a 1,000 H. P. engine has been contracted. With these alterations and additions the company's entire plant will occupy a space of sixteen acres. They now have on their pay roll about 1,000 men and all departments are running to the fullest capacity.

"In all of my experience of twenty-five years of rolling copper I have never seen labor so scarce," said a Pittsburg rolling mill superintendent recently. "Our mill has searched the South and other sections of the country and still we cannot get laborers. I think the scarcity is largely due to the Western ranchmen and wheat growers coming to the industrial centers and offering extra wages for laborers to market their cattle and crops. As a result we copper rollers are undergoing considerable hardship."

According to the U. S. Geological Survey the production of lead in 1905, for the United States, was 399,302 short tons. This was about 5,000 tons less than was produced in 1904.

REFINISHING OF CHANDELIERS, ANDIRONS AND BRASS AND COPPER GOODS IN GENERAL.

By Charles H. Proctor.

In this age of electro-motive force it is possible to accomplish many things that a decade or two ago were impossible. By moving a lever or pressing a button a motive power can be produced by which work can be done which would otherwise demand a money outlay which would exceed the remuneration.

Recently inquiries have appeared in The Metal Industry from dealers in gas and electric fixtures somewhat as follows: "How can I refinish chandeliers; I want to get gilt, brush brass and oxidized finish?" Therefore the writer thought a short article on this subject would prove interesting to the inexperienced worker in the polishing and refinishing of metals, and more especially to those who deal in that class of goods. The latter may have in connection with their business a small repair shop and if without the necessary information may have to depend upon others for the refinishing of their goods.

For refinishing brass, bronze, or copper articles—that is articles made from the solid, either cast or sheet—the following plant will be needed:

First.—The potash bath contained in iron tanks. This is to be of 25 gallons capacity or less and may be heated by gas, coke, coal, or any other method. This is for removing old lacquer from the articles to be replated, and is also used for removing oil or grease.

Second.—A small wooden tank for holding water for washing and rinsing purposes.

Third.—The bright acid dip contained in earthenware jars for producing the rich natural color on the metals.

Fourth.—Means for obtaining hot water.

Fifth.—A wooden box containing maple sawdust.

Sixth.—An electric motor or polishing lathe with two spindles for polishing the metals and the necessary polishing compositions.

Seventh.—A tin lined wooden box or other receptacle for benzine or gasoline for removing the polishing composition after finishing.

Eighth.—Tin pans or pails to hold lacquer.

The chemical baths are made up as follows:

The potash bath is ½ lb. caustic potash to each gallon of water. The bright acid dip should be made up as follows and enough should be used to immerse the articles, say 10 gallons:

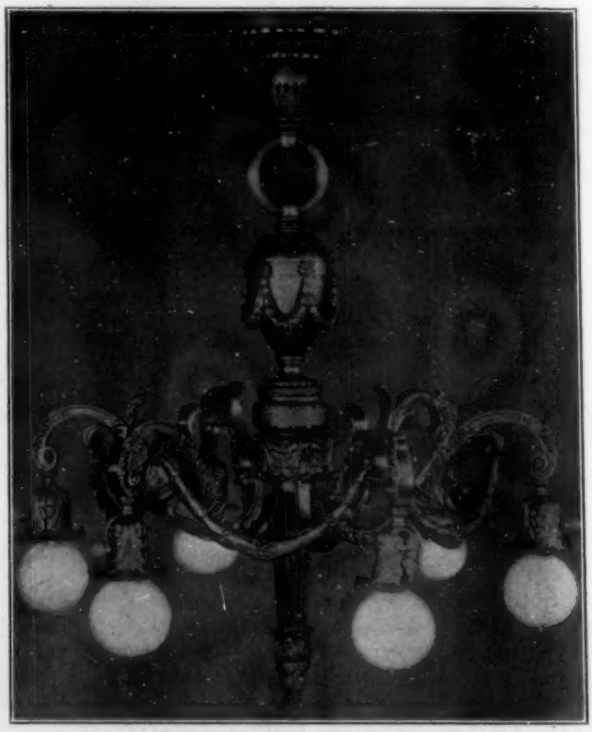
Yellow aqua fortis 38 per cent..	1	gal.
Oil of vitriol 66 per cent.....	1	gal.
Water	½	gal.
Rock salt.....	8	ozs.

Add the vitriol slowly to the aqua fortis, then add the water and finally the salt; let stand for 10 hours before using.

For the polishing buffs unbleached muslin is used; this can be purchased in sections from dealers in platers' supplies. With ½ to 1 horsepower motors 8-inch wheels can be used for finishing; 6 or 8 sections are used for cutting and 5 or 6 sections for finishing. The polishing composition consists of tripoli for cutting and rouge for finishing, both to be had from dealers.

For producing old brass effects a fine brass wire scratch brush is used. This is placed upon the lathe or motor spindle in place of the buff and is used in the same manner, but without any composition. Powdered pumice stone mixed with common flour and water is used to produce the dead luster, the articles being kept wet with a weak washing soda solution.

Having the above apparatus in place we will suppose that a chandelier is to be refinished. First make a rough sketch of the chandelier for reference when reassembling and number each part as it is removed. Keep on hand a small amount of soft copper wire, about 16 gage. String as many of the parts upon the wire as can be conveniently handled. Now immerse in your potash bath, which should be hot, for 15 minutes to remove the old lacquer. Remove from this



A CHANDELIER MADE BY THE MITCHELL-VANCE COMPANY.

bath and wash in cold water. Drain well and pass rapidly through the bright acid dip. Drain quickly and immerse in cold water; wash well and pass through hot water. The articles should now appear like new goods.

Now have the cutting down buff in position and apply a little tripoli composition to the buff. This will cut the surface of the metal and give it a luster. After all the parts have been touched the articles are washed in benzine or gasoline if much of the tripoli is in the ground work or recesses, although with care this can be avoided. The articles are now ready to be finished or colored in the following manner:

Take a piece of hard wood and drive half a dozen nails through it so they project about ¼ of an inch. With this comb out the polishing wheel, which should be of the dimensions mentioned, until it is soft and woolly to the touch. Now apply a little rouge composition and go over the articles with a rapid motion, pressing lightly against the wheel. The shells can be spun against the wheel if small wooden chucks are made to hold them.

The articles are now washed in benzine or gasoline, using a painter's dusting or varnish brush for the purpose of removing the rouge from the crevices. Drain and dry out in maple sawdust; then wipe the articles with a piece of cotton flannel and lacquer.

The lacquer should be a transparent dip. The articles are placed upon hooks made of iron wire and after dipping in the lacquer are hung up to dry. They will dry more quickly if heat can be applied to them. All hollow articles should be plugged so as to prevent the lacquer getting inside. When the parts have thoroughly dried they are reassembled. To make the joints tight white or red lead in oil is used, or better still, gas fitters' wax. For gold finish a gold lacquer must be used, which comes ready prepared and can be had from dealers. The lacquers are applied with a varnish or badger's hair brush, the 1½-inch size being generally used. Gold lacquer must be applied evenly or the work will show streaks in drying. It is best to dry such work in ovens or upon hot plates of iron; the color is made richer by heat.

The old brass effect is produced in the same way, only the coloring is dispensed with and the dead luster is caused by the brass wire brush. This should be 5 inches diameter, with four rows of holes; it should be fitted upon the spindle of the lathe or motor. A slight pressure against the wheel will produce the dead effect when using pumice stone and water as mentioned above. After finishing the articles are washed in cold water and if stains appear a solution containing 1 oz. muriatic acid to each gallon of water will remove them very quickly.

The black effect found in the back grounds of old and brush brass is produced in the following way: Drop black, ground in japan, is mixed with turpentine and applied carefully to the parts to be antiqued with a soft brush. This is done after the articles have been lacquered. In a few minutes the black will dry. Now remove the excess with rags slightly moistened with turpentine. Use a little of the thinner furnished with the lacquers; this brightens up the brass. Afterward go over those places where the black has been applied with the lacquer brush only slightly moistened.

Colors for the green finishes are made up from dry colors, soluble blue, zinc white and chrome yellow, mixed with 1 part turpentine copal varnish and 4 parts turpentine. These colors are applied in the same manner as antique effects in old brass. Many tones can be produced, especially Pompeian brass, which is a blue green.

By following the above simple directions any articles made of brass, bronze or copper can be refinished. Dealers in this class of goods might build up quite a trade in connection with their regular business and would find ample returns for their outlay, which would be small compared with the results.

LEAD ALLOYS.

By Lincoln Burrows.

The alloys in which lead is mostly found are those used for solders, bearing metals and type-metals. Originally there was a standard composition for each of these compounds, but experiment and adaptation for special uses has changed them to a great extent. For general trade use, a line of standard compositions is still made so that one is sure of getting the same mixture each time. To the ordinary user, the question of composition, unfortunately, does not enter. It is too often a matter of price, without regard as to whether the alloy contains 80 per cent. lead or 80 per cent. tin. An example of the variation from standard compositions may be mentioned in the case of bearing metals. The original Babbitt metal contained only tin, antimony and copper, but to-day one can buy so-called Babbitt metal under any name and is liable to find the tin entirely replaced by a cheaper metal, with the sole virtue that it is cheaper.

The only way for a manufacturer to insure the best results is to find out just what alloys are best for his different bearings, solders, etc., have the samples analyzed by a chemist and get them exactly reproduced by his smelter. This practice is growing among the large users of these alloys. All large corporations and departments of the government when advertising for bids publish a specification calling for an exact composition, this applying to brasses as well, with the further restriction that only new metal be used in its making. It was found essential to specify this because of the use of scrap in making new compositions. One instance of this will illustrate how serious this matter may become in bidding on government work with the intention of using scrap of unknown composition. A contractor received an order for a large amount of Muntz metal of a strictly 60 per cent. copper, 40 per cent. zinc composition, which showed on delivery over 5 per cent. lead and about 2 per cent. tin. The contractor was positive that these metals were not added as such, but he had used scrap and the lead and tin had entered the metal through the scrap. There is no objection to the use of scrap; but in careful, especially specification, work, the exact composition of the scrap used must be known.

Very often solders of warranted half-and-half composition are found to be very far from this on analysis due to two causes: one, the use of scrap; the other, the temptation to substitute lead for tin owing to the difference in price. The using of scrap often introduces antimony unconsciously into a solder where for general purposes its presence is not looked upon with favor. A reliable concern warranting a solder of half-and-half composition can be depended upon. I know of an instance where average samples for a month were found to contain 50.20 per cent. lead and 49.80 per cent. tin. Wiping solders often contain as much as 3 per cent. antimony with good results, as it imparts a rigidity to the molten alloy which renders it easier to work on a joint.

The old type metals were nearly always of a lead and antimony composition containing from 3-10 lead for one of antimony, but with the introduction of the linotype all sorts of compositions are now used; among the other metals may be found tin, copper, bismuth, cadmium, zinc and arsenic. As a rule, the lead is usually about 75 to 80 per cent. of the alloy.

Many special alloys contain lead, such as fire or fusible plugs used on fire doors and fire extinguishers. The Japanese used small amounts of lead in making their celebrated "Kara Kane" bells, especially in the large ones. Small amounts of lead are often found in brasses, bronze statuary and old coins.

The following rules for general alloy-making, given by Brant, are excellent: (1) The melting pot should be red hot and the most difficult metal to fuse melted first. (2) Be sure the metal or alloy already in the pot is thoroughly melted before adding the next. (3)

The fused mass must be thoroughly stirred with a clean, dry piece of wood. (The gases which are distilled from the wood serve to stir up the metal and the carbon monoxide produced keeps the surface from drossing to some extent.) (4) In making a new alloy, use some of the old. (5) Be sure the pot is clean, and free from all previous operations.

TABLE OF SOME LEAD ALLOYS.

Solders.	Lead (Pb.)	Tin (Sn.)	Bismuth (Bi.)	Melting Point.
Bismuth	1	1	1	284° F.
No. 1.	25	1	..	558° "
No. 2.	10	1	..	541° "
No. 3.	5	1	..	511° "
No. 4.	3	1	..	482° "
No. 5.	2	1	..	441° "
No. 6.	1	1	..	370° "
No. 7.	1	1½	..	334° "
No. 8.	1	2	..	340° "

Nos. 4 to 8 are used for ordinary plumbers' work; No. 8 is used for lead and tin pipes and also Britannia metal.

WATCH CASE RESTRICTIONS IN ENGLAND.

Consul Albert Halstead, of Birmingham, states hereafter that watches of foreign manufacture, whose cases are gold or silver, must be assayed, stamped and marked before being offered for sale in the United Kingdom. The consul states:

"This requirement, which has heretofore applied only to British watches, follows from a recent decision of the court of appeal of the British supreme court of judicature. The case may be carried to the House of Lords, but until their decision it stands as the law of the United Kingdom. The decision removes a long-continuing ground of complaint of British watch and watch-case manufacturers, that while their gold or silver watch cases, even when completed by the works or movements, had to be "hall-marked" that was not required of completed watches of foreign manufacture, and was only applied to foreign gold or silver cases that did not contain the movements.

"The decision is of great importance to American watch manufacturers and may lessen the exportation of their products to the United Kingdom, because watch cases, in order to be "hall-marked" must be sent over in the rough to be assayed, stamped, and marked by the Goldsmiths' Company in London, the mint in Birmingham, or any other officially recognized hall-marking place in the United Kingdom. After being 'hall-marked' the watch cases must be returned to the United States to be polished. The case concerned watches imported from Switzerland, but the decision affects all foreign watches.

"To the jewelers of this district the decision is a boon. British manufacturers declare it was unjust that, as a result of what they considered discrimination against the domestic product, American, Swiss and other makers could sell a 'gold' watch which was partly gold and partly base metal. They claim that many a man thinks to-day he has a solid gold watch, bought at auction, which though it has a gold outer case has an inner case of base metal."

LEAD MELTING PLANT.

Type Metals.	Lead (Pb.)	Antimony (Sb.)	Tin (Sn.)	Copper (Cu.)	Zinc (Zn.)
Common	9	1	..	..	..
Large type.....7-6		1	..	..	..
Middle type.....	5	1	..	..	..
Small type.....	4	1	..	..	..
Smallest type....	3	1	..	..	..
Erhardts' type...	3	..	2	2	93

Other Alloys.	Lead (Pb.)	Tin (Sn.)	Copper (Cu.)	Zinc (Zn.)	Bismuth (Bi.)	Cadmium (Cd.)	Cobalt (Co.)	Antimony (Sb.)	Iron (Fe.)
Fire extinguisher heads	27.57	13.12	....	....	51.71	....	7.58	....	..
Coffin handles....	85.41	2.11	....	....	....	....	....	12.48	..
Chinese bronze...	9.90	4.36	82.72	1.86	....	....	....	....	.55
Japanese bronze..	5.68	1.94	86.38	3.36	....	....	....	1.61	.67

Fusible Alloys	Lead (Pb.)	Cadmium (Cd.)	Tin (Sn.)	Bismuth (Bi.)	Melting Point.
Lipowitz's metal.....	8	3	4	15	158° F.
Wood's metal.....	4	2	2	5	160° "
Onion's lead.....	3	..	2	5	197° "
_____	5	..	3	2	210° "

AMERICAN METAL TRADE CONDITIONS FOR THE YEAR 1906—PROSPECTS FOR 1907.

By S. D. V. Burr.

Last year presented several anomalies in the production, manufacturing and handling of the non-ferrous metals. In at least three instances the demand far exceeded the output of crude metal and in neither was the supply increased. We refer to platinum, tin and copper. During this period the prices of these metals went up, the rise being more pronounced during the last half of the year than the first. Platinum went up about 60 per cent, tin about 20 per cent and copper about 40 per cent. The production of the first two was not materially increased, neither the shipments from Russia nor the Straits Settlements being augmented. Mining was not pushed and new developments did not materialize. The Ural mines, judging from persistent and seemingly trustworthy rumors, are now being pushed to their full capacity, and many believe they have seen their best rate of production and are on the decline. The scarcity of this metal and its high price have stimulated the search for new deposits, and considerable encouragement has followed the examination of the black sands of our Western States.

The Montana and Lake copper properties have not met the demand and the rich deposits of Utah, California and Nevada are still in an embryonic condition of development. In this connection it must not be overlooked that the output of a paying copper property cannot be increased at will, neither can new mines be made productive at once. In both cases it requires time—months and years—to provide the equipment required for profitable working. The old mines have been operated to their full capacity—that is, the full capacity of the openings and the machinery in place—and therefore on the most economical plan, since running at full capacity invariably means cheapest production.

Gold production has increased by jumps and the world production for 1905 has been estimated at $375,000,000 and for last year in the neighborhood of $400,000,000. The price has remained stationary throughout the year.

In the case of silver the conditions have been just the reverse. The output has remained practically at one point, but the price has gone up about 10 per cent.

Pig iron and diamonds are the true barometers of trade conditions. When iron is prosperous, with strong demand and high prices, precious stones are always in the ascendant. Last year the production of pig iron reached the enormous total of 25,000,000 tons, the price rose and at the present time iron products cannot be obtained at deliveries sooner than four to six months. Last year we imported diamonds to the value of $34,000,000, by far the largest amount in our history. Diamonds and pig iron travel up and down the scale together.

When we examine the trade surroundings of last year and seek the reason for the great metal demand we are forced to the conclusion that the growth was solely along old and well-established lines. In not a single instance was the development beyond what might have been expected when we view the entire field. There has been, particularly in the case of platinum, a more general use of platinum products which, coupled with the restricted supply, may account for the advance in price. Undoubtedly the general prosperity has permitted the employment of this costly metal in places where slower trade would have barred it. This is true of the other metals, but to a less degree.

In manufactured articles the demand has been due directly to easy and plenty money. This is true to a marked extent in all art metal work. The expensiveness of the design has seemed to have had little or no effect upon the sales. After the necessities of life had been purchased there has been some capital left and this has found its way to the market for luxuries. Never before in the history of art metal work have manufacturers made up for the regular trade articles of such an expensive character and of such intrinsic value; their whole experience during the year has shown that it was not a question of cost but of artistic merit.

Foreign trade has been both satisfactory and disappointing. The growth of our exportations to France of silver, bronze and copper work of the highest grade has been most gratifying. That our products should be welcomed and sold in that home of art metal work speaks well for our designers. At the same time we have missed trade opportunities of a not insignificant character. There are trade openings in Mexico, Central and South America which we are simply ignoring. These markets are for copper and bronze, silver and silver-plated articles, especially the latter. The same holds good, but not in so marked a degree, in Northern Africa and India for silver appliances. In this direction the art metal manufacturer is apparently following the path of the machine tool builders—has trade enough at home and has neither time nor inclination to explore foreign fields. While we are resting content with our own business the Germans and English are exploiting those markets and building upon a foundation we shall have difficulty in overcoming when we wake up to the fact that a certain amount of foreign trade is a good thing to have.

The prospects for the coming year are exceedingly bright. This opinion is founded upon the fact that the output of all the principal metals has been disposed of for the next three to six months. Contracts calling for any considerable quantity of material are accepted only for deliveries far in the future. When the crash comes—and it will come or history will not repeat itself—it will be through the financial world, as it always has. The indications are that as long as money is handled legitimately and conservatively we may expect present trade and perhaps better.

THE BRITISH BRASS, SILVER AND JEWELRY TRADE FOR 1906—OUTLOOK FOR 1907.

By J. Horton.

A general survey of the British non-ferrous metal trades for 1906 shows a marked improvement compared with the previous year and the outlook for 1907 is cheerful, but there are certain disadvantageous circumstances which counterbalance the benefits to some extent and diminish the makers' satisfaction.

The Brass Trade.—This trade is still in a state of transition due to the introduction and extension of the capstan lathe and the increasing practice of producing articles from the solid bar instead of from the casting. This has materially cheapened production, but profits are cut very fine on account of the dearness of copper.

Copper has increased to the Birmingham purchaser during the year from £64 to £103 10s., and zinc also is very materially dearer. It is notorious that manufacturers have not been able to recoup themselves for these advances by higher prices. The increases of prices have been, during this year, three of 5 per cent each, and a further 5 per cent towards the end of last year. The ideal is that there shall be an addition of a penny a pound

on brass for every ten pounds added to copper, but the manufacturers have not been able to obtain this, and in some cases they complain that their business is very much like giving change for a shilling. The principal sufferers have been the makers who have depended mostly on hand work for which machinery is not applicable. It is in this branch of the trade that the only complaints of slackness are to be found. The general complaint here is that buyers are purchasing small parcels, buying dozens where they formerly bought grosses, so that the trade is largely of a hand-to-mouth character. A very common complaint is that the buyer of brass is not as careful about high-class artistic work as he ought to be. This seems to be the explanation for the partial failure of a scheme started in October last for the establishment of a brass founders' trade school. The idea of the promoters was to teach the various forms of art applicable to the trade and especially to encourage designing. But many manufacturers are holding aloof, on the ground that the trade is becoming more and more a machine industry and the public do not care to pay for high art in connection with brass goods.

COMPETITION.—Generally speaking, the competition complained of is home competition, but in some goods, notably lamp holders, the Germans have captured a good deal of the trade. Makers say the goods can't be made any cheaper. But the German gets the pull in being able by the use of our free market to greatly increase his turnover. In gas and electric fittings of the kind which can be cheaply produced there is a big trade and for all sorts of ship furnishing requisites there have been big sales. Where profit has been made it has been got mainly by "scheming" and the reduction generally of working costs. This has been found possible in various ways besides the introduction of machinery. Many shops have adopted the use of power from suction gas plants and the general verdict is that the system is extremely economical and most effective. The user is independent of the outside power producer and can stop his plant any time.

EMPLOYMENT has been practically constant during the year, the best evidence of the improvement being the reduction of out-of-work pay in connection with the National Society of Brassworkers by £2,016 as compared with the previous year. The amount paid was £4,771, but this is due in very few cases to real bad trade. Among the men there is some irritation over the increasing employment of machinery and the extension of girl labor. But as the men are finding employment they are not disposed to make a great grievance of this. In view of the difficulties of the trade, the men have agreed with the employers to allow any wage advances to stand over until next year. It is ten years since the last advance of 5 per cent was obtained. The outlook as far as the demand for goods is concerned is considered good and the position would be greatly improved if the price of metals should be brought to reasonable and workable figures. The men's society leaders regard the prospects as very cheerful.

JEWELRY.—In regard to the jewelry trade, the Assay Office returns for the year ended June 30, 1906, are very fairly representative of the period they cover, but, of course, take no account of the marked revival which began in July and which has been increasing ever since. The returns show that, whereas in 1905 the gold wares assayed and marked totalled 323,610 ounces, those of this year amounted to 349,308 ounces. Silver wares totaled for the earlier period 3,689,065 ounces and for the later period 3,838,482 ounces. The number of gold and silver wares entered for assaying increased from 12,345,634 to 12,894,981. The return of wages by the Jewelers' Association under their compensation insurance scheme, which covers about 50 per cent of the trade, shows an increase from £450,000 to £487,000. In conjunction with the figures must be considered the increase among manufacturers of the hall-marking of goods in compliance with a growing public demand. At the end of the year business generally was booming and most of the factories worked overtime throughout the autumn. There are practically no out-of-works among the skilled workmen. But in several respects the year has been one of transition. The general tendency is to take on younger men and girls. The recommendation of the former is not only lower wages, but the fact that the art schools, and especially the jewelers' school, are doing great good in turning out skilled craftsmen who are clever designers. German competition has compelled the Birmingham maker to wake up. In fact, this year has seen the market swamped with cheap German jewelry. In fancy jewelry generally the Germans are beating their competitors in cheapness, lightness and beauty of design. There are great complaints over the freedom with which Germans are able to use the English hall-mark. The foreigner takes full advantage of his ability to mark his goods in different parts and make them up afterwards. The effect is that while a part of a bracelet, for example, may be marked 9-carat the curb attached is very often of a much lower quality. There seems no prospect of any reform in this respect.

SILVER.—The year has been a trying one in the silver industry, mainly because of the high price of metal. In respect of the amount of business done it has been a revival year. Leading houses notice a curious relation between the silver and the iron and steel trade. When the latter is busy so invariably is silver. At the present time all the makers are working overtime and putting on every workman they can find. Generally speaking, markets are widening and the range of articles continually extending. The general expectation was that the high price of silver would cause a reversion to electro-plate for many domestic articles, but nothing of this sort has happened. In the early part of the year most makers put on 10 per cent in respect of the increase in price, but this has proved absurdly inadequate. All the large houses book up to August for their Christmas trade, and one of the leading Birmingham makers reports a typical experience. Their catalogues were complete and their books full of orders by August. Since then they have taken on practically nothing, but they could not alter their prices and they could not refuse to execute orders already taken. The result will be that, though the output has been phenomenal, profits will approach the vanishing point. If the increase goes on, as seems likely, during next year a large addition to selling prices will be inevitable. The trade has benefited greatly by its use of the hall-mark, which is coming more and more into favor. Nearly all buyers look for it as the essential token of genuineness. In this respect America with its brand merely of the word "sterling" has fallen behind a good deal. The export trade is increasing to almost all parts of the world and we are doing a splendid trade at present with the Colonies, the Dominion of Canada and the Argentine. The kindred trade of electro-plate is still extending. The prospects for the coming year are excellent and more records are likely to be established.

The manganese mines of the Batoum district, in the Russian Caucasus, are the richest in the world, employing thousands of workmen above and below ground. The annual exportation of ore is about half a million tons.

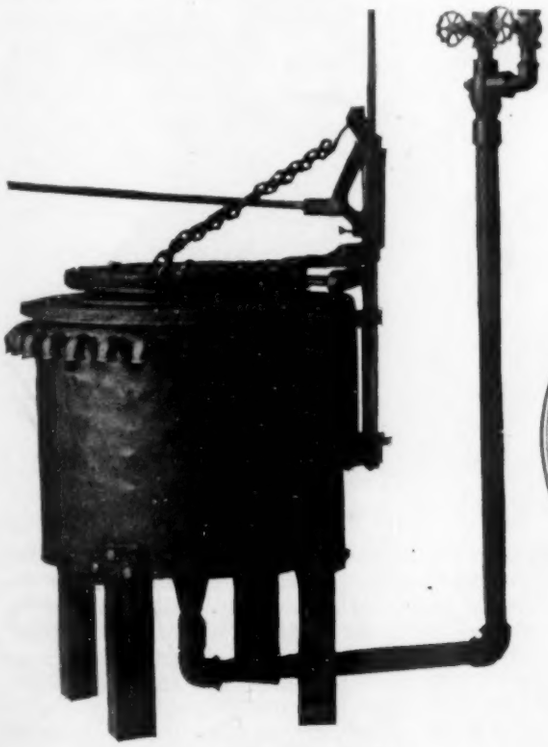
INDUSTRIAL

NEW AND USEFUL MACHINERY, DEVICES, APPLANCES AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

THE CLEVELAND ALUMINUM FURNACE.

The wonderful increase in the use of aluminum castings, not only for automobile parts, but for all other lines of manufacture, has caused the foundryman to seek some economical method of melting the metal, which will not only be easy of operation, but will produce a first class grade of castings. The low temperature at which aluminum melts has led the J. D. Smith Foundry Supply Company, of Cleveland, O., to design the Cleveland aluminum furnace here illustrated.

This furnace consists of a cast iron shell lined with



ALUMINUM FURNACE.

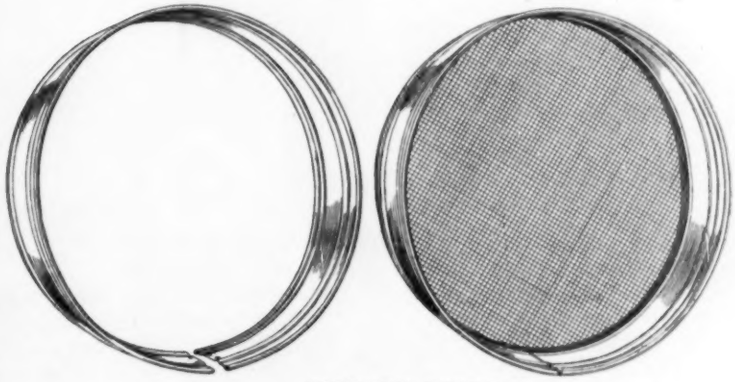
a special high grade fire brick; the aluminum is melted in a thin cast iron pot by means of natural or artificial gas, using air under a pressure of 2 pounds. The melting is done under cover, the melted metal being dipped out by special ladles or by small crucibles. The pot holds 225 pounds of melted aluminum and requires about 45 minutes to take off a heat. The furnace is meeting with great success, as it is producing metal for the highest grade of castings. The pot is specially coated on the inside, which not only increases the life of the pot, but prevents the addition of any iron to the metal. Each pot is good for about 10,000 pounds of aluminum and it requires no time or labor to insert a new one.

A very neat device consists of a motor and compressor mounted on a sub-base and belt driven. A small receiver with a blow-off is provided, the receiver standing on a boiler stand. A mixer is provided above the furnace within easy reach of the operator. The plant is a very compact one, a floor space of only about 4 feet wide by 10 feet long being required for one furnace. The company furnish the compressor, receiver stand, blow-off, and all valves; they also provide motors of all voltages and both direct and alternating current.

With natural gas at 30 cents per 1,000 feet it costs about 7 cents for fuel to melt 100 pounds of aluminum. The company will give the exact cost of operation if informed of the cost of the gas it is intended to use.

THE GALVARIM RIDDLE.

The "Galvarim" riddle, placed on the market by the Detroit Foundry Supply Company, Detroit, Mich., is made in two parts—the bottom and rim. With this construction the bottom is the only part to wear out and it can be replaced at about half the cost of a good new wood riddle. The rim is turned top and bottom over a 3-16-inch steel rod; it has two concaves or recesses which allow for the snug fit of any mesh wire bottom. The bottom or wire cloth is turned over a



GALVARIM RIDDLE.

3-16-inch rod by machinery, dispensing with cross rods.

A wood-rimmed riddle frequently splits before it has had hardly any use, thus destroying its usefulness. The worst that can happen to a galvarim riddle would be the destroying the bottom, which, as just mentioned, can be easily replaced. When the wood riddle becomes gummed up it is useless, but with the other it can be placed in the oven and the gum burned off, making it good as new. Over 2,000 dozens of these riddles are now in use.

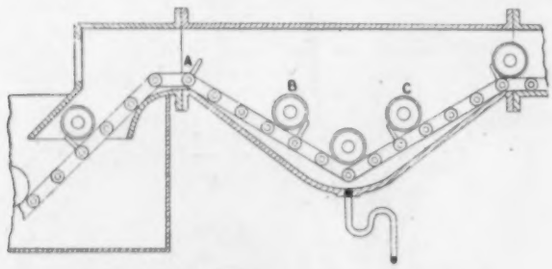
FIFTEEN PER CENT. PHOSPHOR COPPER.

R. F. Lang, a manufacturers' agent, 2, 4 and 6 Old Slip, New York City, is putting on the market a royal brand of phosphor copper which he guarantees to contain 10 to 15 per cent of phosphorus and which is claimed to be of uniform quality. Founders who have tried it report very satisfactory results. Besides this deoxidizer Mr. Lang also handles phosphor tin. Sample lots of his alloys can be had by applying at his office. Mr. Lang's products are of German make.

WATER SEALED ANNEALING FURNACE.

It has been found that cartridge cases and other hollow articles, when heaped pell mell into boxes for annealing, carry a small amount of water from the inlet water seal into the annealing chamber, owing to the position of some of the cases permitting them to hold water; this causes a needless expenditure of fuel to boil out this water, and consequently a loss of time in annealing. All this is done away with in the new furnace built by the Bates & Peard Patent Annealing Furnace Company, for whom C. M. Dally, 29 Broadway, New York City, is the general agent in this country.

To obviate the trouble from water an ingenious device has been apapted to this type of furnace, which completely removes all water from the articles to be annealed before they enter the heated portion of the annealing chamber. This device, shown in the sectional drawing, consists of a cast iron dip pocket interposed between the inlet mouthpiece and the anealing chamber proper, and is provided with depression rollers, which give a slight angle of descent and ascent to the conveyor chain, which is also provided with upright pegs, or stops, to confine the boxes carrying the articles to be annealed within certain defined limits. At the lowest point of the dip pocket an outlet drain is provided, sealed by an "S" bend which



ATTACHMENT FOR ANNEALING FURNACE.

takes away the water as soon as it is deposited in the pocket. The boxes are circular, and have a circumference sufficiently less than the distance between the stops to insure their making a quarter of a turn when descending or ascending the dip pocket; the boxes move on runner links attached to the chain conveyor.

The boxes, having been placed on the conveyor against a stop peg, descend through and rise out of the water seal; arriving at A, the edge of the dip pocket, they rapidly roll down to the next stop peg B in front, this part rotation of the box being sufficient to reverse the position of the articles which are holding water and completely empty them. As the conveyor proceeds to descend the slope, the box slowly revolves back until the back stop again comes into contact with it, when it is carried up the slope C and thence into the annealing chamber.

These furnaces have been used quite extensively in England, especially for the annealing of cartridge cases. They are built in two standard sizes, the single and the double type, which can be varied in their dimensions to suit any particular specifications. It is very evident that the device is applicable to any articles so shaped as to retain moisture.

Silicon copper, which has been made for the past fifteen years by the Electric Smelting and Aluminum Company, of Lockport, N. Y., is still one of the most popular deoxidizers for casting copper and is sold in increasing quantities every year.

THE GREEN PLATING DYNAMOTOR.

The plating dynamotor manufactured by the W. Green Electric Company, 81 Nassau street, New York City, is adapted for gold, silver, nickel, copper plating, etc. It is a plating dynamo and power motor combined in one and is self-operated by any direct current, light or power circuit. The outfit is wound to run on 110, 220, or 500 volt circuits, and will deliver to the tank a 4 to 8 volt current for plating, exactly like the regular plating dynamos. Since the combination is self-contained it may be placed in any position, either vertical or horizontal.

These dynamotors are compound wound, have phosphor bronze bearing sleeves, self-oiling bearings and extra large commutators and brushes. The armature, with its bearings and brush rigging, can be quickly and readily removed for examination or repair by loosening the screws on one side of the machine. It is only necessary to connect the wires from the regular switch cut-out to the primary end of the machine; the switch is then closed when the regular plating current of 5 volts or less will be delivered at the secondary terminals. The strength of the current may be con-

PLATING DYNAMOTOR.

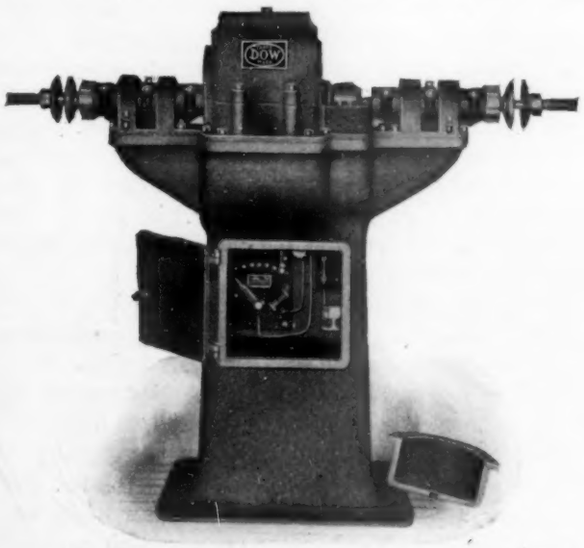
trolled to any desired extent with the company's regular tank rheostat, while the voltage may be reduced to any extent by means of a speed controller connected to the primary or motor end of the machine. These dynamotors are capable of much finer control than is possible with a dynamo alone, and for this reason are very valuable in connection with gold plating and coloring equipments. The current from the dynamotor cannot be reversed under any condition of load or adjustment.

These machines are made in sizes capable of depositing from 6 to 25 cwts. of gold per hour. They all run at a speed of 1,800 revolutions and weigh from 70 pounds for the smallest size up to 225 pounds for the largest. Some time ago the company supplied the Western Union Telegraph Company with 10 of these machines on trial and a few days ago received an order for 75 more.

Every consumer of tin will be glad to learn that there is a prospect of tin being produced in Alaska in commercial quantities. Metallurgists who have examined ore from that country report that it contains 30 per cent and will concentrate 70 per cent of tin. The ores were also free from iron. The Bartels Tin Mining Company has made an initial shipment of ten tons of Alaska tin and claims to have enough ore in sight to keep a modern quadruple discharge mill busy.

THE DOW MOTOR-DRIVEN GRINDING AND POLISHING MACHINE.

The Dow Chemical Manufacturing Company, of Mansfield, O., are introducing a motor-driven grinding and polishing machine which can be considered a standard design both mechanically and electrically. This machine possesses many special and distinct features. The pedestal or base is extremely heavy and well proportioned. It encloses all electrical accessories and easy access to these is obtained through a large door in front; no live wires or parts are exposed to the outside. The working parts of the motor are entirely enclosed and protected from dust, as well as the ends of the bearings. The brush holders are of the parallel down feed type and require no adjusting whatever. The commutator is of liberal proportions, the segments are made of hard drawn copper and are insulated with the best grade of mica,



MOTOR DRIVEN GRINDING AND POLISHING MACHINE.

and are so well proportioned that a uniform wear is maintained between the mica and copper. The armature core is slotted to receive the form wound armature coils, and insulated sufficiently to withstand an electrical test of 2,000 volts alternating current.

The field coils are wound upon a form and insulated and slipped on to the steel magnet cores. The coils are of circular form, which insures the highest efficiency in this part of the machine. The form of the machine makes it possible to receive large field coils, thus obtaining an enormously strong magnetic field in proportion to the size of the motor. Sparking at the brushes is entirely eliminated as the load varies from zero to large ranges of overload. The magnet cores and pole faces are made from steel of the highest permeability and are bolted to the magnet yoke, and can be easily removed if necessary. The arbors are of hammered steel and the ends are provided with wheel flanges and square thread nuts.

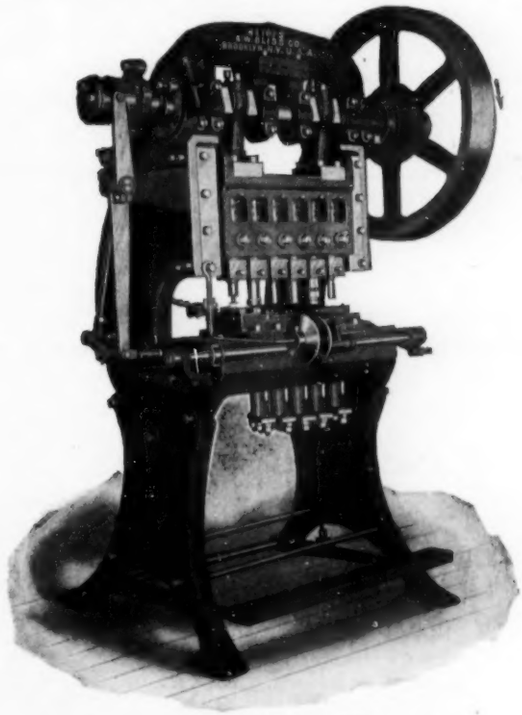
The bearing are well proportioned for diameter and the length is greatly in excess of common practice. The bearings are designed to meet the difficult requirements demanded for this class of work and very little or no wear is to be expected, thus keeping the machine constantly in smooth and quiet running order. Two oil rings are furnished for each bearing, which keep a constant supply of oil on the arbor. Oil slingers are provided at the end of the bearings that throw the oil back in the casing, so that none is thrown outside. This arrangement keeps the machine clean and free from oil inside and out.

The magnet yoke, as will be seen by the engraving, is parted horizontally in the center. This makes it very convenient whenever it becomes necessary to remove the armature when the top part of the yoke with the covers of the bearings can be lifted off. The armature can then be lifted out without disturbing the alignment of the bearings. This feature is very valuable since the machine need not be moved from its foundation, which is necessary when the yoke is built in one piece. This advantage will be appreciated.

THE BLISS SPECIAL AUTOMATIC PRESS.

When manufacturing articles out of sheet metal that require a number of operations there are often conditions when it is especially advantageous to use a press that will do away with all intermediate handling by automatically carrying the article to be produced successively from one to another of the several dies.

The press illustrated has been designed for this purpose and it is particularly adapted for manufacturing small articles of aluminum, brass, copper and similar



AUTOMATIC PRESS.

metals. The press takes the metal from the reel at the back, and by means of a grip feed pulls the stock under the first operation punch where the blank is cut and partly formed. After this operation, lateral jaws close in on the piece and then carry it to the right under the second punch and so on until it has passed under the six punches and has been discharged finished from the press.

After the sixth stroke, an article is finished every time the slide comes down. The press makes 60 strokes or 360 operations per minute, and this is equivalent to the work of from eight to ten power presses fed by hand. To say nothing of the expense for intermediate handling and the room occupied by the large number of plain presses, the saving is apparent. The reel in front of the press is for winding up the scrap. The machine weighs complete about 2,500 pounds, and has been built by the E. W. Bliss Co., 23 Adams street, Brooklyn, N. Y.

EDITORIAL

OLD SERIES VOL. 13, NO. 1. NEW YORK, JANUARY, 1907. NEW SERIES VOL. 5, NO. 1.

THE METAL INDUSTRY
EMBRACING
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
AND
ELECTRO PLATERS REVIEW

PUBLISHED MONTHLY BY
The Metal Industry Publishing Company
(Incorporated)
61 BEEKMAN STREET, NEW YORK
Telephone No. 4983 Beekman. Cable Address, Metalustry.

PALMER H. LANGDON, ... *Editor and Publisher*
S. D. V. BURR, ... *Mechanical Editor*
JOHN B. WOODWARD, ... *Director*

Subscription Price $1.00 per year, postpaid to any part of the world. Single copies, 10 cents.

ADVERTISING RATES ON APPLICATION.

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THE METAL INDUSTRY PUBLISHING COMPANY.

ENTERED FEBRUARY 10, 1903, AT NEW YORK, N. Y., AS SECOND CLASS MATTER UNDER ACT OF CONGRESS MARCH 3, 1879.

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VOLUME 5. NUMBER 1.

In starting our fifth year, which we do with this issue, we have added sixteen pages of reading and advertising matter and introduced several departments which we believe will be of particular value to our readers.

The new features include a Metallurgical Digest in which we shall review the principal matter published in the leading metallurgical journals of the world. A department of Associations and Societies has been added, which will post our readers on what the various trade organizations are doing to improve trade conditions. Our department of Personals is not entirely new to the pages of THE METAL INDUSTRY, as we have heretofore published this matter under the heading of "Trade News," but we are firm in the opinion that men who make the industry are of enough importance to have a page devoted to them each month, which will relate both to the living and the dead.

Our Correspondence Department of questions and answers, dealing as it does with the daily problems of the industry, has grown continually and we have added another page of reading matter in this department. In keeping with the custom of the age, we have moved our Editorial pages to the center of the paper, putting the principal articles first, followed by the Industrial, Editorial and other departments. There are two additional pages of principal articles, every one of which is written by a specialist in his respective line. Our Criticism and Comment page is open to the opinions of every one and we shall be pleased to publish without fear or favor any criticism or comment on any matter of interest to the readers of THE METAL INDUSTRY.

Five pages in this issue will be valuable reading matter and reference for any day of the year 1907, viz.: "The American Trade Conditions in 1906, Prospect for 1907," "The British Metal Trades for 1906 and Outlook for 1907," "The Metal Market Review," the "Chart of Metal Prices" and tables on the "Production of Metals for the Past Ten Years." All of these pages contain valuable statistical matter which we have taken great pains to edit and have absolutely correct.

Last but not least we call the attention of our patrons to our advertising pages, which are always a constant guide of the metals, machinery and supplies needed in the operation of metal working establishments from foundries making ton castings to manufacturing jewelers producing scarf pins.

It is gratifying to us that our four years of effort to issue a truly representative journal of the non-ferrous metal industry meets with the approval of the industry at large and that our journal continues to grow in size, circulation and standing.

THE ALUMINUM INDUSTRY.

If the brass business is a secretive one so far as methods of manufacture are concerned the aluminum business is more so, for we believe no industry withholds the facts about production, improvements and methods like the various aluminum companies. For the past year there has been a shortage of aluminum the world over and in order to find out what each aluminum company was doing to relieve this shortage THE METAL INDUSTRY made an honest effort to get a report from each one. Of the five companies in the world which are producing aluminum but one, the Societe Anonyme pour L'Industrie de L'Aluminum, Neuhausen, Switzerland, sent a report of which we are pleased to print the following:

"We have the pleasure to inform you that very extensive measures have been taken by this company in order to satisfy the aluminum market. While in the past we have been working with only 24,000 H. P., we shall soon have 100,000 H. P. in full working order for the production of aluminum. We do not care to give you the exact figure of our present and future output, but wish you to understand that in the course of 1907 our production of aluminum will gradually be increased so as to reach in the following year a figure amounting to five times our present output. This will certainly put an end to the present shortage of aluminum, the more so because all the other aluminum producers are likewise increasing their output and we feel sure that at an early date the production of aluminum will be far in excess of any probable demand."

This in brief describes what steps our Swiss friends are taking to produce more metal, and while it does not give the amount of production, it outlines what the company is doing to relieve the shortage.

An authority estimates that a properly run aluminum plant should make 500 pounds of aluminum a year for each horse-power and that theoretically 1,000 pounds is possible. Therefore, figuring on a practical basis, a company with 100,000 H. P. should produce 50,000,000 pounds of aluminum per year, which can be readily seen is a large amount when the American production for the year 1905 was, according to the United States Geological Survey, 11,347,000 pounds and the production in 1906 is estimated to be 14,350,000 pounds.

No official information is obtainable about the American enlargements, but it has been stated that the American Company is spending several million dollars in improvements which are being made at East St. Louis, Ill., where the bauxite refining plant is situated, and at Niagara Falls, N. Y.; Massena, N. Y., and Shawinigan, Canada, where are the several water powers. It is understood that the immediate development in utilization of water powers at Niagara, Massena and Shawinigan will total to 50,000 H. P., and that ultimately the development will double this amount, giving a total of 100,000 H. P., or an output of 50,000,000 pounds, equal to the production of the Swiss works cited above.

Announcement has been made of the water power improvements of the British works, though no figures are obtainable at this writing, and it is stated that the French and Austrian works are also being increased. Therefore, the total aluminum production of the world within the next few years will be a very important factor as compared with the production of the rest of the non-ferrous metals.

It can be readily realized what an amount of capital is necessary to conduct a business utilizing 100,000 H. P. and all of its necessary adjuncts in the line of refining works, smelting works, rolling mills and finishing shops and when it is considered that twenty years ago aluminum itself was sold as a precious metal and that the amount of the yearly production was hardly worth noting, it is evident that the industry has had a tremendous growth.

THE ROLLING MILLS, NEW AND OLD.

Early in 1907 a number of new rolling mills will be in operation and the output of the established mills will be increased considerably. The mills are located in various sections of the country and it is expected that when the wheels of the new and enlarged mills begin to turn that they will relieve the general shortage in manufactured metals.

The foremost of the new mills to turn out metal will probably be the Michigan Copper & Brass Company, Detroit, Mich., which, as mentioned in our December number, expects to have their machinery in motion by March 1. This being a very large mill, it will be able to produce considerable stock as soon as it can get in working order.

Second in the mills to begin operations will be the Waterbury Rolling Mills (incorporated), Waterbury, Conn., the building for which is now practically completed and which will soon have all of its machinery in position. The management expect to roll German silver for the market on or before April 1.

Of the other two mills which are under construction the time when they will be rolling metal is rather indefinite, though it is presumed that the new tube mill of the National Conduit & Cable Company at Hastings, N. Y., will be in operation within six months and that the new mill of the Pittsburgh Reduction Company (now the Aluminum Company of America) at Niagara Falls, N. Y., may be in operation by the same time. Both of these mills are of considerable size and their output will be an important factor in the metal trades.

Still another new rolling mill is reported to be projected—one for the manufacture of wire and which it is said will be located in Ohio. Further particulars are at present unobtainable, though the project has advanced sufficiently for plans to be drawn for the equipment.

The starting of these new mills and the completion of the enlargements and improvements which are being made in old mills will no doubt be welcome news to those consumers of sheet, rod and tubing who have had difficulty for some time past to get a sufficient supply of these products.

Crucible manufacturers utter a word of caution to users of crucible oil furnaces to be careful in feeding the oil. Too much or too little is said to cause trouble.

CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ALL ARTICLES PUBLISHED IN THE METAL INDUSTRY.

BLACK NICKEL AND ITS PRODUCTION.

To the Editor of THE METAL INDUSTRY:

During the past year I have noted in THE METAL INDUSTRY many inquiries in regard to "black nickel" and its production, and while this is not a new subject to many of your readers, still there are continually new additions to your ranks and the writer thought a few remarks upon this subject would not prove uninteresting.

Among the rank and file of the plating fraternity to-day there are many who commenced their labors more than a quarter of a century ago. About eighteen years ago there was an unusual demand for antique finishes such as we find upon the market to-day, and antique brass was one of the most popular finishes then as it is now. This brought forth much experimenting among platers to produce a black deposit to be used for relief purposes in the production of this finish. The result was the black nickel solution which is used by many platers at the present time and which gives excellent results. This formula consisted of 8 ozs. double nickel salts and 4 ozs. common salt to each gallon of water. This is to be worked for a short time with the electric current until it is in good condition. Ammonia water was then added in the proportion of 1 or 2 ozs. to the gallon of solution, and finally cyanide was added until the precipitate formed had been redissolved. A concentrated solution of arsenious acid in concentrate cyanide of potassium was then prepared by using 1 lb. arsenic to 2½ lbs. of cyanide in ½ gal. of boiling water. This was allowed to cool and a dense black solution resulted. So much of this solution was added to the nickel bath mentioned above as to produce a beautiful black deposit upon polished brass, bronze, copper or silver. This bath gave excellent results and improved with age, it being only necessary to add a little of the arsenious cyanide occasionally to keep it in working condition. The only fault to be found was that it needed a large amount of current in proportion to the cathode surface. Nickel anodes were used.

The black nickel solutions of the present time consist largely of an alkaline nickel solution, to which is added from 2 to 2½ ozs. of sulpho-cyanide of potash to each gallon of solution. Some platers have proposed adding sulphate of zinc, others sulphate of copper to this solution. But to do so impairs the lustre of the deposit and gives it a muddy appearance.

A formula that I have constantly used is made up as follows:

Single sulphate of nickel	5 ozs.
Sal ammoniac	3 "
Sulpho-cyanide of potash	2½ "
Sodium bisulphite	½ oz.
Water	1 gal.

The solution is prepared by using a small amount of hot water for the solution of the salts and then adding the necessary amount of cold water. Ammonia water, 26 per cent, is then added in the proportion of 2 ozs. to the gallon of solution. A current strength equivalent to a good working nickel solution should be used. The solution is easily maintained in working condition by noting the following: When it produces too dark a deposit nickel sulphate should be added with a little ammonia; when too light, add some sulpho-cyanide. Brass anodes should be used in connection with this bath. In all cases the solution should be electrized for some time before using.

December, 1906. CHAS. H. PROCTOR.

ANNEALING SILVER.

To the Editor of THE METAL INDUSTRY:

A good method of keeping fire out of silver is the following: Take boracic acid and dissolve it in hot water. Heat the article to be annealed and immerse in same; allow to dry and then proceed with the annealing and if done properly no fire will form.

Brooklyn, N. Y. EDW. E. NEWTON.

NEW BOOKS.

The Manufacture of Metallic Articles Electrolytically —Electro Engraving. By Dr. W. Pfanhauser; translated by Joseph W. Richards; 6 x 9 inches; illustrated. The Chemical Publishing Company, Easton, Pa. Price, $1.25.

This treatise—small, but of great value—deals with the manufacture of metallic articles by electrolytic methods. M. H. Jacobi, who presented the results of his pioneer work to the St. Petersburg Academy of Sciences in 1838, is generally acknowledged as the founder of galvanoplastic reproduction and the industrial development of copper precipitation resulting therefrom. Jacobi, like all the workers in galvanoplasty up to the last 30 years, worked with the well known cell apparatus. Murray introduced the graphitizing of non-conducting surfaces in 1840 and in 1842 reproduced the first engraved copper plates by galvanoplastic methods. But the manufacture of useful articles in the electrolytic way only became possible with the advent of the dynamo machine, which furnished the large quantities of the electric current needed. At the present time there are a large number of technically available processes in which copper is used as the depositing metal; only very recently has the deposition of nickel become of importance, since in the case of nickel there are quite serious difficulties which limit the availability of this otherwise most suitable metal. The book is divided into chapters which are arranged chronologically as far as possible; the headings are as follows and they clearly show the scope of the matter: Baths for copper galvanoplasty; physical properties of the copper deposit; behavior of copper anodes; constants of the bath and calculation of the amount of deposit; particular devices for special purposes and production of uniform deposits; manufacture of metallic powders and the like; manufacture of metallic foil; production of wire; manufacture of bodies of large size; manufacture of parabolic mirrors and of tubes; electrolytic etching and engraving. These subjects are treated historically, and the discoveries that led up to the processes as we now know them are outlined. The matter is placed in a concise way and the subject is developed in an attractive manner; whenever necessary illustrations have been introduced.

CORRESPONDENCE

IN THIS DEPARTMENT WE WILL ANSWER ANY QUESTION RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

METALLURGICAL.

Q.—We have a large number of small brass rings which must be soldered at the joint. Soft solder is not strong enough. The rings are ¾ inch in diameter and made of No. 18 wire.

A.—A good way to apply the solder and flux would be to place the rings upon a gas pipe threaded at both ends so that the rings could be held firmly with nuts. The heat could be applied in a muffle or by a charcoal fire with the help of a fairly large blow pipe to act upon the joint. A solder composed of 1 part copper and 1 part zinc, to which is added a little silver, gives excellent results.

Q.—What heat would you recommend for annealing brass for drawing, or does it make any difference?

A.—The proper temperature for this work is a dull red heat, about 800 or 1000 degrees F. It is customary with large New England concerns to anneal their brass shell work upon iron pans, wood being the fuel used. Gas is also used to a large extent by some companies. An improvement upon the regular annealing pans would be to have an oblong frame made of heavy sheet iron about 6 inches deep, the bottom being made of iron wire at least ⅜ inch; ¼ inch wire would answer if the mesh were reinforced at intervals. This pan should be placed upon wheels that would raise it from 4 to 6 inches. Such a plan would permit the annealing to be done more uniformly, since the heat would have a better chance to circulate.

Q.—Kindly advise us if you know of any practical way of removing the lint and other accumulations of the polishing room from brass grindings. We have made several experiments by burning the lint and dirt in a crucible, but owing to the great amount of coke used and the small proportion of brass saved by this process, we do not gain anything.

A.—The only practical method we are aware of for recovering the brass from polishing room accumulations is to burn it in some way; either in the open air or in a closed retort. After the organic matter has been disposed of the residue is placed in a tank tilted slightly and washed with water; this carries off the burned material and leaves the metal at the bottom.

Q.—I would like a receipt for making iron rough like sand blasting. The iron is ⅛ inch thck and rolled smooth. I have tried nitric and muriatic acids.

A.—Hydrofluoric acid diluted to a 10 per cent solution will probably roughen the surface of iron as well as anything if it remains in the acid an hour or more. But such a strong solution attacks the iron in such a manner that it is not satisfactory for plating purposes, especially when left in the acid too long. We are of the opinion that you will be unable to get an effect by chemical means as satisfactory as sand blasting upon iron.

Q.—Can you give us a description of a process by which a casting can be made that will conform exactly to a certain size? The casting must be duplicated each time the same as a machine piece would be. Allowance can be made in the pattern for shrinkage, but the finished productions must be uniform. We wish to apply this to small castings.

A.—Several firms make a specialty of manufacturing "finished castings" that require no machining. The alloys used consist of zinc and tin chiefly, although aluminum and zinc, in the proportion of 2 parts of the former to 1 of the latter, produces an alloy approaching cast iron very closely in its physical features, but is much more elastic. This is the so-called new metal "alzen." The metal molds used are made in as many pieces as possible and the alloys are cast under pressure. The molds cost $100 each and upward, depending upon the intricacy of the pattern, and unless 5,000 or more castings are wanted from each pattern there is no economy in this process. Select a plain piece, make your mold of machine steel, hinged like a glass mold, and use the most suitable alloy for your purpose.

Q.—Please give us information on the subject of babbitting car bearings—best method of tinning them, removing grease before tinning, best mandrels to use, etc.

A.—When rebabbitting car bearings the grease is usually removed by holding the bearings under melted babbitt. They are then brushed with a solution of chloride of zinc (made by dissolving metallic zinc in hydrochloric acid to saturation), and heated. The tinning is done with a solder composed of lead 60 parts, tin 40 parts, cast in small sticks. Use a pad made of burlap for spreading the solder over the surface of the bearing. Mandrels are usually made of cast iron. The joints are mudded up with red clay and a semi-circular piece of sheet steel may be clamped to the mandrel to serve as a gate. If clay alone is used for building up a gate, cover it with machine oil so it will not flow.

Q.—How can I stop the cutting or chewing of phospor bronze castings in green sand and how can I get the dark surface on the castings? I also want a good phosphor bronze formula for a metal having high tensile strength, one for hard or bearing metal and one for soft and general use?

A.—The cutting of the phosphor bronze in green sand may be prevented by the use of a high grade of silver lead facing. Soapstone well brushed into the face of the mold often gives good results and is much cheaper than the silver lead. A standard phosphor bronze for bearings is composed of copper 78, lead 11, tin 10 and phosphorus 1. A softer phosphor bronze, is composed of copper 92½, tin 7 and phosphorus ½.

Q.—We are casting real light brass scrolls for gasoline lamp chandeliers. We make these in very large quantities and have been molding them the same as any other brass castings. Is there any cheaper and quicker method than with the ordinary wet sand?

A.—A pressure casting process has been used to some extent in manufacturing very light chandelier brass castings. It is questionable, however, whether the castings can be turned out as quickly or cheaply as when the ordinary methods are followed. Plaster of Paris molds are used and they must be thoroughly dried before casting. Some very fine and intricate art work has been made by this method, but it is generally regarded as too expensive for commercial castings.

PLATING AND FINISHING.

Q.—We use a cyanide bath and an acid copper bath for copper plating iron and steel, and have been having trouble about the plate peeling off. It comes out of the copper baths looking well and buffs up all right, but after immersing in hot potash the copper peels off. Heating the copper plate in any way has a tendency to blister and causes it to peel off. Can you tell us what the trouble is?

A.—If your work is perfectly clean and your solution is correct the only reason for the trouble is too much free cyanide or ammonia in the solution; or your solution may be too dense; if it stands over 10 baume reduce it with water. In any event add 1 oz. bisulphite of soda and 1 oz. sal. soda to each gallon of solution in use. This may remedy the trouble but do not use ammonia. Flashing in the nickel bath also produces good results and takes the acid copper readily. It is an advantage to use a separate copper striking bath containing only a small percentage of free sulphuric acid. This enables the work to be completely coated before immersion in the regular acid bath. A good formula for a cyanide of copper bath that will not blister is the following:

Cyanide potassium	6 oz.
Red sulphite copper	2 "
Bisulphite soda	2 "
Water	1 gal.

Dissolve the cyanide in 1-3 the water and add the copper. Dissolve the soda in the rest of the water and then mix. Use the solution warm.

Q.—Kindly tell me why we have to run our brass solution partly green if we desire to get the best results?

A.—We should say that your brass solution is slightly deficient in cyanide. By using a strong current and an excess of ammonia more copper is probably reduced than is taken up by the work. The excess of copper, with the ammonia, forms ammonia copper, and without free cyanide to take up this a slightly greenish solution is formed. It is well to add zinc dissolved in ammonia and cyanide; by this method the color can be regulated without using an excess of ammonia and the solution will recover its normal color, which should be like "old ale."

Q.—How can I color cast bronze after it has filed and chased, which naturally leaves it bright and brassy in color? The color I want is the regular soft bronze color one finds in banks and public buildings.

A.—Clean your piece of bronze thoroughly, then acid dip it, if possible using yellow aqua fortis for this purpose. Now make up a solution of 1 oz. of liver of sulphur in 1 gal. of water and use slightly warm. After dipping and washing in clean water dry by passing through boiling water and boxwood or maple sawdust. Scratch brush, when the bronze tone will be produced. If not deep enough dip a second time, and dry but do not brush. The articles are usually lacquered.

Q.—I would like a solution for an oxidized copper finish on brass, such as is used for gas chandeliers, without plating.

A.—The oxidized copper finish upon chandeliers is done by first electro-plating with copper and then oxidizing with liver of sulphur, scratch brushing dry and then relieving with pumice stone, or a felt buff and tripoli. In an amateurish way this may be imitated by dissolving 8 oz. sulphate of copper in each gallon of water and immersing the perfectly clean part wrapped around with iron wire. In 15 minutes a copper deposit will be obtained that may be oxidized in the usual manner, using ½ oz. liver of sulphur to each gallon of water. Relieve and lacquer in the usual way.

Q.—I send you a name plate. You will notice that it has white streaks on it. What is the trouble?

A.—We have examined the name plate and have come to the conclusion that the white streaking is due to the improper removal of the oxides formed in the cleaning process. Probably your cyanide cleaning solution has become too contaminated from the continuous removing of the oxides and produces stains. Prepare a new cyanide solution and keep it at 80 or 90 degrees and note the result. Also use care in rinsing your work, especially if you use a nickel deposit before silver plating. Oxides do not remove readily when the solutions are kept below 70 degrees.

Q.—I have a silver plating solution in which the anodes dissolve very rapidly; in fact, an anode 1-16 of an inch thick will disappear in about 3 hours. The deposit seems to be all right and the work comes out smooth. The solution carries about 2 ounces of silver to the gallon.

A.—You have evidently too much free cyanide in the solution or your cathode surface is very much too large in proportion to the anode surface. The best method to determine this is to weigh the work before and after plating for one day, and keep the exact weight of the anodes on that particular day. In this way you will be able to determine whether your silver is being deposited upon the work or being absorbed by the excess of cyanide in the bath. Free cyanide also requires a higher amperage when too much cyanide is present; this would also be the cause of an excessive reduction of silver in proportion to the amount deposited.

Q.—Kindly give a formula for (1) fine yellow gold and (2) gun metal finish for cheap work.

A.—(1) A good formula for a fine yellow gold should consist of the following:

Phosphate of soda	8 oz.
Bisulphite of soda	1½ oz.
C. P. cyanide potassium	6 dwts.
Neutral chloride gold	7½ dwts.
Water	1 gal.

3 dwts. fine gold reduced to chloride will answer the same purpose.

The solution should be used nearly boiling. Anodes of platinum or fine gold can be used. (2) For a gun metal finish dissolve ½ lb. white arsenic and 1 lb. of caustic soda in 1 pint of hot water, and 4 ozs. single sulphate of nickel in another pint of water. Mix the two solutions and then add ¾ gal. commercial muriatic acid. Use a low current and nickel anodes. If the solution does not deposit satisfactorily make a concentrated solution of sulphate of copper with boiling water and add a little of this to the solution.

Q.—Will you kindly describe the forms for coppering small steel articles without the aid of battery or dynamo?

A.—Small articles of steel may be coppered in the following solution:

Sulphate copper	4 ounces
Oil vitriol	3 ounces
Water	5 gallons

The solution should be used cold. The articles

should be freed from grease by tumbling in maple wood sawdust. Then immerse in the solution for a few seconds, using acid dipping brass wire baskets. After coppering, wash in cold water and then pass through boiling water to which has been added a small amount of common yellow soap. Dry in maple sawdust. Another method is to moisten the sawdust with the solution, and tumble the articles in this for a few minutes. Sift the sawdust from the articles and finish in dry dust.

Q.—(1) I have several pounds of sulphuret of potassium which has been exposed to the air. Can I do anything with it to make it work? (2) Can you give me a formula for a nitrate of silver solution for making looking glases?

A.—(1) When sulphuret of potassium becomes decomposed by exposure to the air it is of very little use. You can revive it somewhat by adding ⅓ common potash to ⅔ of the sulphuret. (2) The following formulas are used successfully for silvering glass: (A.) Reducing solution: Dissolve 12 grains of rochelle salts in 12 ozs. boiling water. While boiling add 16 grains nitrate of silver dissolved in 1 oz. water and boil for 10 minutes. Then add sufficient water to make up the loss from evaporation. (B) Silvering solution: Dissolve 1 oz. nitrate of silver in 10 ozs. water and add liquid ammonia until the brown precipitate is nearly but not quite dissolved. Add 1 oz. grain alcohol and sufficient water to make 12 ozs. To silver take equal parts of A and B. Mix thoroughly and lay the glass, face down, in the mixture, after it has been carefully cleaned with potash or washing soda and well rinsed with water. The dishes in which the silvering is done should be only a little larger than the glass.

Q.—Kindly let me know what will dissolve dragon's blood.

A.—Pure dragon's blood can be dissolved in any of the following: Grain alcohol, refined wood alcohol, fusel oil, amyl acetate and benzole.

Q.—I have tried your formula for the deposition of spelter, tin and aluminum, but have not made a success of it on steel sheets. I would also like a bath for depositing pure copper.

A.—If you have had no experience in the deposition of metals you will naturally find some little difficulty in getting practical results. The formula submitted to you has given the best results in experienced hands. Pure copper can be readily deposited upon sheet steel. For heavy deposits it is necessary to have two solutions: first the cyanide of copper bath and second the acid copper bath. The first should consist of:

Cyanide potassium	6 ozs.
Red copper compound	2 "
Bisulphite soda	2 "
Water	1 gal.

Dissolve the cyanide in part of the water, then add the copper compound. Dissolve the soda in the rest of the water and mix the two. Use the solution warm. The anodes should be of soft copper or electrolytic, and the distance between the anodes and cathode should not be over 6 inches. The acid bath should consist of 1¼ pounds sulphate copper and 3 ounces 66 per cent. sulphuric acid to each gallon of water. Add 1 ounce transparent white glue to each 10 gallons of solution. The anodes should be as previously mentioned and the solution should be run cold. It is necessary to have the sheets chemically clean.

Q.—Let me know how I can obtain chloride and sulphate from the metal zinc.

A.—For zinc chloride take 1 part muriatic acid and 1 part water and in the mixture dissolve as much metallic zinc as it will take up. For sulphate of zinc take 1 part sulphuric acid and 1 part water and dissolve the zinc in this. To produce the dry salts the solutions are to be evaporated and then the deposit dried.

Q.—In what condition must I have my sulphate of copper solution in order to produce the satin-like ormolu finish for gold work?

A.—Your solution should stand about 15 degrees and should contain about 3 per cent free acid or about 1¼ pounds of sulphate and 3 ounces of oil of vitriol to each gallon, and ½ ounce transparent glue to each 10 gallons.

Q.—Kindly tell me how the steel piece I send you is plated?

A.—The sample has not been electroplated. The process is to prepare a molten bath of equal parts of tin and lead. Bright drawn steel is used in coils which are immersed in a concentrated solution of chloride of zinc in muriatic acid. The strip of steel should be passed through the molten metal bath and the surplus metal wiped from it as it passes out of the bath. The strip is then redrawn through steel plates just large enough so that the deposit will be smoothed down and brightened. The Washburn & Moen Company, of Worcester, Mass., make this class of strip metal.

Q.—I would like a formula for a bright dip and also a gold solution.

A.—One of the best bright dips, that gives good results from the start is:

Pale aqua fortis 38%	1 gal.
Oil of vitriol 66%	1 "
Rock salt	8 ozs.
Water	½ gal.

First mix the vitriol and aqua fortis, then add the water and salt. A satisfactory gold solution should consist of

Water	1 gal.
Phosphate of soda	8 ozs.
Bisulphite of soda	1½ "
C. P. cyanide of potassium	6 dwts.
Pure chloride of gold	6 "

The following is a copper solution for all metals to be used either hot or cold

Cyanide of potassium	3 ozs.
Dry carbonate of copper	2 "
Carbonate of soda	3 "
Bisulphite of soda	2½ "
Water	1 gal.

Dissolve the soda in part of the water and to this add the copper. In the rest of the water place the cyanide; then mix the two.

Q.—Will you please tell me how to roll round head iron screws so that they will be very bright and extremely white; something superior to what can be done on a buff wheel?

A.—The finish upon the screw sent for inspection was probably accomplished in two tumbling operations. First use leather scraps and pumice stone or tripoli and a little kerosene oil. In the second tumbling use leather meal and rouge mixed with wood alcohol. If plated with the regular basket or tumbling method the heads should be colored with white lime composition to give a high lustre, although good results can be hand with plating barrels.

METALLURGICAL DIGEST

A REVIEW OF METALLURGICAL MATTERS OF THE WORLD.
TRANSLATED AND EDITED BY HOWARD GREEN BAYLES, MET. E.

CLEANING AND PICKLING COPPER-ALLOY CASTINGS.

Translated from Der Metallarbeiter.

The purpose of pickling castings is to effect the removal of adhering sand, casting skin and surface oxide. It is the sand which offers the most difficulties and takes the most time, especially if it is burned very hard. But no matter how lightly or heavily crusted, dilute sulphuric acid is probably the best pickling solution, and the best strength for regular use is 8 to 10 parts of commercial acid in 100 parts of water. It is this matter of the strength of the bath that has been responsible for many failures to produce good results, as workmen are likely to try to accelerate the cleaning by making the solution stronger, with the result of retarding or spoiling the work.

The cleaning proceeds most rapidly if the solution is kept at a temperature of 140 to 160 degrees Fahrenheit. Such a warm bath will remove ordinary oxide within 20 to 30 minutes. The time necessary to remove molding sand naturally depends on how firmly the sand is burned fast. The most complicated pieces, with deep indentations in which the sand is exceptionally hard, may take 15 to 20 hours, but so long as this is unusual. Time is not a very serious consideration, however, for the only labor charge to be taken into account is that of putting pieces into the bath and taking them out when finished, and the acid does not charge by the hour. If it is desirable to hurry the cleaning, however, the action of the acid may be facilitated by going over the casting from time to time with a scraper or wire brush. It helps particularly, also, if the casting is put into the pickle before it cools. The resulting quick contraction cracks off or loosens the scale, on account of the difference in the coefficients of expansion of the metal and the crust. Naturally, if the acid can get under the scale, it can complete its work in a comparatively short time. After this pickling, copper-zinc alloys have a soft frosted yellow color, while copper-tin alloys are usually rather more red. In either case the color depends on the amount of copper in the casting. As a rule the color is not perfectly uniform, but has a somewhat mottled appearance, owing to the unequal corroding of the two metals by the acid.

After the acid treatment is completed, a thorough rinsing is necessary, for any acid that is not removed will show itself in the unwelcome discolorations that every shop tries to avoid. The rinsing should take place either in a tank of running water, or may be performed directly in the running stream itself. If the pieces are not to be treated further, but are to be stored for a time, they must be dried. Sawdust is to be preferred to a hot-room, since, if the water is evaporated, it leaves behind it any solids which it may carry in solution. These form a thin crust on the casting, which may interfere with plating or any other subsequent operation. Sawdust, however, removes both the water and any impurities it may contain.

The above process of treating copper-alloy castings in dilute sulphuric acid is almost exclusively undertaken in order to make possible subsequent treatment, as it is the exception when a piece can be considered finished with the corroded matte surface left at this point. In order to apply this cleaning method practically, the only apparatus needed is a vessel or tank to hold the acid solution, another for the rinsing, fitted with a water faucet if possible, and a large box full of sawdust for drying. For small pieces, acid-proof stone crocks may be used for both baths. For larger pieces, which would endanger the safety of stone vessels, tanks of wood lined with sheet lead may be used. The best wood for this purpose is oak that has been impregnated with creosote. The lead lining should be 3-16 or ¼ inch thick, and its seams carefully burned to prevent leaks.

If brass or bronze articles are to be left with a matte surface, the color may in most cases be improved by following the above treatment by a short immersion in a pickle made of a mixture of undiluted commercial sulphuric and nitric acids. The pieces will have an especially fine finish if a little common salt (sodium chloride) and lamp black are added to this bath. Earthenware vessels are the only sort that will stand this concentrated acid mixture. The treatment of the casting is ended as soon as brown vapor begins to appear. The article must then be rinsed immediately and thoroughly in quantities of clean water, and dried in sawdust. If the castings are too large to be placed easily in a jar or large crock, the strong acid can be poured over them. To do this well requires some little experience and skill.

The proportions in which the acids are mixed depends on the character of the alloy to be treated and on the desired finish. The only way to determine the best formula for any special class of work is to start with equal parts and then to add one or the other as the conditions to be met dictate. The approximate proportions of the other ingredients are one part of salt and ½ part of lamp black to each 100 parts of the acid mixture.

If these acid finished castings remain for a time exposed to the air, they will become oxidized, no matter how thorough the rinsing and drying may have been, as it is impossible to get absolutely all of the acid out of the little pores of the etched surface. In order to retard this as far as possible, the pieces may be given a brief immersion after washing in a dilute solution of argol, or crude potassium bitartrate. After drying, this leaves a thin transparent skin on the surface, that affords a pretty satisfactory protection.

(To be Continued.)

ANTIMONY.

La Metallurgie tells us that a systematic attempt to find mines in the French province of Cantal has resulted in uncovering some very promising antimony prospects.

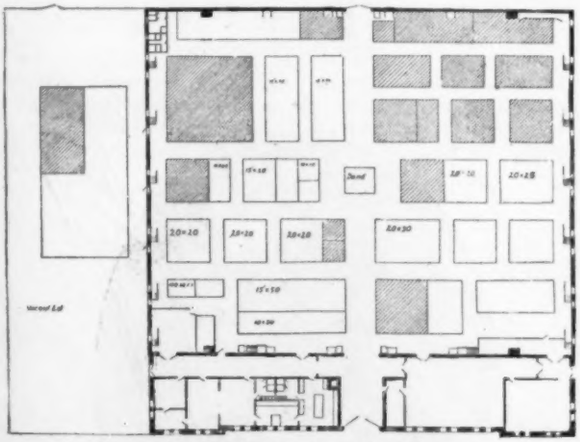
Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

THE FOUNDRY SUPPLY ASSOCIATION.—610 Schofield Building, Cleveland, O.; president, S. T. Johnson; secretary, H. M. Lane. This association was organized to co-operate with the American Foundrymen's Association and have charge of the exhibits which have become such a feature at all the conventions of the parent association. The following is an account of what the Foundry Supply Association is doing for the convention of the foundrymen:

The preparations for the convention of the American Foundrymen's Association, to be held in Philadelphia May 20 to 24 next, are progressing very nicely, and the exhibit of foundry supplies and equipment to be held in connection therewith by the Foundry Supply Association is now an assured success. A floor plan of the armory has been prepared, as shown in the accompanying illustration. The armory is a building 160 by 165 feet on the inside, with a number of rooms adjacent, one of which will be used for the meetings of the A. F. A. Adjoining the armory at the side there is a vacant lot 100 by 200 feet, in which there will be erected a temporary building for such exhibits as could not ordinarily be placed in the armory.

The space already definitely allotted is indicated by the cross-sectional areas. In addition to that already allotted there are



ARRANGEMENT OF SPACE.

several applications which have been received which have not as yet been allotted on account of the fact that the size of the space has not been determined. It is expected that there will be a number of exhibits in the temporary building in the vacant lot adjoining the armory. This will include oil melting furnaces and machines which require special foundations. Arrangements have been made for supplying compressed air for those requiring it. The exhibits already arranged for cover practically the entire line of equipment for foundries, but it is hoped that those who have not as yet joined the association or availed themselves of the opportunities in connection with the exhibit, will make haste to do so while there is still space available.

This convention will undoubtedly be by far the largest gathering of foundrymen which has ever been brought together, as it now appears certain that there will be over a thousand present from outside of Philadelphia. The program, as thus far outlined, is better than that presented at any of the previous conventions. The fact that the Brass Foundrymen's Supply Association will be organized during the convention assures the attendance of a very large number of foundrymen interested in brass foundry practice, and one session will be devoted to brass foundry interests. The foundry foremen will, of course, as usual, be represented and hold special sessions.

H. M. Lane, the secretary of the Foundry Supply Association, has resigned his position as editor of "The Foundry," with the intention of devoting his energies to consulting foundry engineering, but the new arrangement will give him ample time to look after all the necessary preparations for the Philadelphia convention, and to make it the greatest success possible.

Applications for membership in the association, or for space in the exhibit, should be sent to H. M. Lane, Schofield Building, Cleveland, O.

AMERICAN BRASS FOUNDERS' ASSOCIATION.—President, Chas. J. Caley, New Britain, Conn.; secretary, Richard Moldenke, Watchung, N. J. The formation of this society in connection with the American Foundrymen's Association was suggested at the last convention of the Foundrymen's Association, held in Cleveland, and the above officers elected. Complete organization is to be perfected at the meeting of the American Brass Founders' Association, in May, at Philadelphia, Pa. In response to an appeal for members the secretary reports that he has received 327 very encouraging replies and he looks forward to a successful formation of the new association at the coming convention. The preparations for this convention are progressing steadily and from all indications the gathering will be the greatest ever held in the interest of the foundry industry. A special effort will be made to have a good exhibit of brass foundry supplies, as well as those of iron, and likewise a number of interesting papers on brass foundry subjects. Any suggestions on articles or about the exhibits will be gladly received by the secretary.

THE NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.—President, E. F. Needecker; William M. Webster, commissioner, 1110 Schiller Building, Chicago, Ill. The National Association was formed for the betterment of trade conditions and a settlement of labor troubles. The association meets in different parts of the country in February, May, September and December. The last meeting was held in New York City. The next meeting will be at Milwaukee, Wis.

NEW ENGLAND MANUFACTURING JEWELERS' AND SILVERSMITHS' ASSOCIATION (Incorporated).—No. 42 Weybosset street, Providence, R. I.; William A. Copeland president; H. M. Mays, secretary. The association works along the lines of everything for the betterment of the industry and was instrumental in having the recent stamp act passed in reference to gold jewelry. The board of governors and advisory council meets every Thursday noon to discuss whatever matters are continually coming before them. Two special entertainments are held during the year: one a winter banquet, in which they endeavor to have present the best speaking talent in the United States, and generally lay covers for about five hundred people; the other in June, when they have an excursion in Narragansett Bay, with all sorts of outdoor sports and an outdoor dinner. The secretary reports that the organization has grown to be a notable one and through the guidance of careful counsel they expect to increase their membership. All find that in close contact the imaginary rough edges of competition are gradually worn off and that the open hand and good fellowship reigns to a degree in their industry that never before was known.

THE METAL POLISHERS', BUFFERS', PLATERS', BRASS MOLDERS' AND BRASS AND SILVER WORKERS' INTERNATIONAL UNION OF NORTH AMERICA.—Headquarters, Room, 409, Neave Building, Cincinnati, O.; president, A. D. Grout, Neave Building, Cincinnati, O.; general secretary and treasurer, Chas. R. Atherton, Neave Building, Cincinnati, O. The objects of the society are to improve the condition of the workers in the industry.

ASSOCIATED FOUNDRY FOREMEN.—Frank C. Everitt, secretary, care J. L. Mott Iron Works, Trenton, N. J.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL

E. W. Ireton, 188 Belmont avenue, Jersey City, N. J., is forming a company to make alloys and expects to be ready for business early this year.

Wm. H. Dehn, formerly of Milwaukee, Wis., has assumed the position as factory superintendent for the Kelly & Jones Company of Greensburg, Pa., manufacturers of plumbers' and steamfitters' brass goods.

Milton P. Kahn, who has dealt in metals at 101 Beekman street, New York, has moved to 18 Oak street of the same city, where he has a larger place, including a storehouse. Mr. Kahn deals in all kinds of metals.

W. S. Quigley, of the Rockwell Engineering Company, New York City, will sail the latter part of January for Europe to attend to orders for the Rockwell melting and annealing furnaces and also to establish a number of agencies.

S. Muscat is in charge of the phosphor-tin and babbitt metal departments of the Union Smelting & Refining Company of 606 East 19th street, New York City. Mr. Muscat has made a life study of anti-friction metal and phosphor-tin.

THE METAL INDUSTRY had recently the pleasure of a call from John Treouchoff, of Russia, who visited America to sell a lot of crude platinum which he brought over with him and which he readily disposed of at the platinum works of Baker & Company, Newark, N. J.

At a recent meeting of the Board of Directors of the International Silver Company, Meriden, Conn., resolutions of regret were adopted on the death of President Dodd, and George H. Wilcox, first vice-president, was confirmed as acting president, to serve until the annual meeting.

J. B. Buist is at present on a visit to the United States in the interest of the Dry Galvanizing Process of Sherard Cowper-Coles of London, England. Mr. Buist is a director of the Coles Company, and it is his intention to form a company in America to exploit the United States rights for the use of the Dry Galvanizing Process which has been described in THE METAL INDUSTRY, and which briefly outlined is a method of applying zinc dust to iron surfaces, which method is said to be considerably cheaper than existing methods of galvanizing. A plant using this process is in operation in England and also at the Krupp Works in Essen, Germany.

DEATHS

RICHARD M. BARNETT.

The brass foundry trade will regret to learn of the death of Richard M. Barnett, Newark, N. J., who was known to founders for so many years through his brass foundry supplies. He was born in Rahway, N. J., in 1838, and moved to Newark in 1845, at which time his father, the late Stephen Dodd Barnett, established a malleable iron foundry, which was one of the first malleable foundries built after Seth Boyden gave his process to the public. Mr. Barnett was associated with the late Oscar Barnett until 1884, when he established with his brother another foundry supply house and in 1895 became proprietor of the business under the name of The Brass Founders' Supply Company. The business will be continued by the estate of R. M. Barnett under the supervision of his son, Stockton G. Barnett, who has been connected with the establishment since 1899, and is well qualified for the position, being thoroughly familiar with the technical and the commercial side.

RUFUS WOODWARD GILLETT.

The Detroit Copper & Brass Rolling Mills, of Detroit, Mich., announce with profound sorrow the death of their president, Rufus Woodward Gillett, who died suddenly, December 3, 1906, at his residence, 188 Lafayette Boulevard, Detroit, Mich. Mr. Gillett was at his office in the morning and left for his home when he was suddenly taken with a severe attack of heart failure, which resulted fatally within a few hours. Mr. Gillett was born at Torringford, Litchfield County, Conn., April 22, 1825. From 1856 to 1862 he was secretary and treasurer of the Wolcottville Brass Company, where he acquired a knowledge of the brass and copper business which afterwards resulted in his connection with the Detroit Copper & Brass Rolling Mills. He was one of the original organizers of this corporation and was elected president in 1894, which position he occupied until his death.

SAMUEL DODD.

The sudden death from valvular disease of the heart of Samuel Dodd, president of the International Silver Company, at his home in Meriden, Conn., on the evening of December 12, removes one of the most prominent figures in the silverware trade, and a man most highly respected in business circles and in the community where he had passed the greater part of his life.

Samuel Dodd was the son of Samuel and Frances (Bull) Dodd of Hartford, where he was born October 4, 1834. He was educated in the public schools of Hartford, and passed his

SAMUEL DODD.

youth and early manhood in that city. In 1857 he went to Meriden as cashier in the Home Bank of that city. For ten years he remained in this position and then, in 1867, went into manufacturing, being one of the organizers of the Parker & Casper Co., manufacturers of silverware.

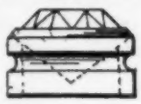
When the International Silver Co. was organized in November, 1898, Mr. Dodd was made its president and retained the office until his death. Under his able management, the business of the company has been greatly increased and new lines have been added to its output. The International Silver Co. is known as the largest producer of high grade plated and sterling silverware in the world.

Mr. Dodd married Catherine, daughter of the late James S. Brooks, of Meriden. She died about eighteen years ago, and their son, Charles T. Dodd, a manufacturer of Meriden, is the only surviving member of the family.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

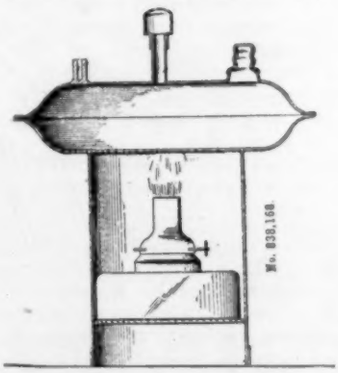
837,615. December 4, 1906. SETTING. George W. Dover, Cranston, R. I. This method is particularly adapted for mounting stones without the use of solder. It is well known that the heat necessary in soldering anneals and weakens the metals next to the soldered joint and that discoloration ultimately takes place. In this new way the body of the setting is constructed from a



No. 837,615

metallic strip or tube into the circular, oval, or rectangular form desired. In the exterior of the box is a groove and the inside of the wall near the top is cut away so as to form a shoulder against which the gem rests. The gem is held firmly by the overturned edges of the top. A convenient way of utilizing this setting is shown in the safety pin, the wire of which is so bent as to enclose the body of the setting.

838,168. December 11, 1906. SOLDERING AND BRAZING APPARATUS. This invention utilizes alcohol, gasoline, or other volatile hydrocarbon for operations requiring concentration of heat, such as soldering and brazing. The apparatus obviates the blast

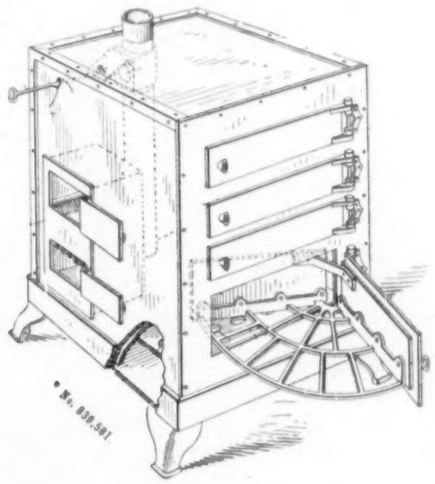


created by the operator blowing through a tube, this being accomplished by generating a vapor in a tank or closed receptacle by the application of heat thereto. This vapor, being under pressure, is then directed through a tube and blow pipe to form the jet of flame.

838,908. December 18, 1906. MOLDING MACHINE. Otto W. Schaum, Philadelphia, Pa. This invention applies particularly to that type of machine in which the pattern, flask and bottom board are turned over together after the sand has been properly rammed. This construction obviates all trouble arising from warped and twisted boards.

838,810. December 18, 1906. SILVER CLEANING COMPOUND. William H. Roome, Derby, Conn. This is a compound for cleaning and brightening silver which is an improvement upon the cyanide of potassium solution. It is composed of the following: Borax, 1½ ozs., cyanide of potassium, ½ oz., and soda ash, 6 ozs. These ingredients are first mixed mechanically and when desired for use are dissolved in two quarts of water. The soda ash is introduced for the porpose of dissolving the sulphide formed on the silver, and which will then be removed by the cyanide.

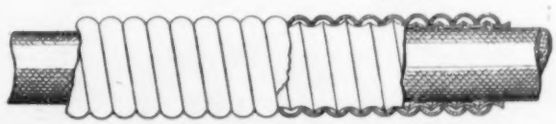
839,581. December 25, 1906. OVEN FOR BAKING SAND CORES. Gustav Harman, Holyoke, Mass. As core ovens of this type have been heretofore constructed the furnace has been located in one corner of the oven chamber and the products of combustion have been carried away through a flue having a portion diagonally arranged in the bottom of the oven at an end as far distant as possible from the furnace and continued in a vertical pipe upwardly through and above the furnace chamber. In such an arrangement the products of combustion do not have the



full measure of circulation desirable, and when the fire is first started there is considerable smoke in the chamber. In the oven here illustrated the bottom is formed double and the top portion is provided with holes which serve as flue passages. The furnace is located in one corner of the chamber and its top is open. The smoke pipe is placed at one side of the chamber and leads from the double bottom through the chamber and out at the top. With this arrangement the products of combustion, after circulating through the chamber, are drawn through the holes in the false bottom to the pipe.

838,179. December 11, 1906. MACHINE FOR MAKING TUBING. E. T. Greenfield, Kiamesha, N. Y. This machine is intended for making tubing by bending long flexible strips of sheet metal spirally, such tubing being adapted for the transmission of water

No. 838,179.



or steam, and as a housing for electric conductors. The tubing may be also used as armor for electric wires. The machine may be used for making various sizes of tubing from strips of various widths. Provision is made for taking up the tubing as it is formed by the bending mechanism of the machine.

831,905. September 25, 1906. CAN MACHINE. James C. Thom, Helmetta, N. J. This invention relates particularly to machines for placing the ends, covers, or bottoms on tin cans and sealing the same. It is to be applied to filled cans.

834,421. October 30, 1906. POLISHING MACHINE. Ole Tverdahl, Coshocton, O. This machine is particularly intended for polishing the edges of sadirons, although it is capable of adaptation for polishing stove trimmings and metal articles generally.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

The Morton B. Smith Company, of 243 Front street, New York City, dealers in metals, are at present making a specialty of copper.

The Goldman Electric Company, of San Francisco, Cal., have added a polishing and plating room to their works at Nineteenth and Bryant streets.

E. Denniston, of the Denniston's San Francisco Plating Works, has erected a permanent building at 1349 Mission street and will soon be running again.

Theo. A. Sippel, 205 McWhorter street, Newark, N. J., has built a large brick factory building to take care of the increasing trade for his sand blasts.

M. L. Barrett & Co., 219 Lake street, Chicago, Ill., are offering free lacquer samples. Further particulars will be found on another page.

The Benedict & Burnham Manufacturing Company, of Waterbury, Conn., are about to construct a new brick boiler house 15 by 93 feet.

The North Chicago plant of the Chicago Hardware Company has been sold to David B. Gann, a lawyer of Chicago. The plant will be run by a new company.

L. H. Gilmer & Co., 504 Arch street, Philadelphia, Pa., now sell twenty or more belt sanding and polishing machines of different patterns. They also make endless belts in endless sizes.

T. B. Hagstoz, Ltd., of 709 Sansom street, Philadelphia, Pa., are sending out a very neat pocket memorandum book. The company do a large business as refiners, smelters and assayers.

The Globe Machine & Stamping Company, 3900 Hamilton avenue, N. E., Cleveland, O., will exhibit at the Madison Square Garden Automobile Show of January 12-19. Their space number is 148.

Chas. A. G. Winther, 170 Summer street, Boston, Mass., offers to send by mail for thirty cents a sample of his Cristoline, for which it is claimed, if applied to any bright metal surface, will prevent tarnishing.

The Yale & Towne Manufacturing Company, Stamford, Conn., are planning to put up new buildings below their new offices, which when completed will, with their present structures, form a complete square.

The Samuel F. Tatum Company, Cincinnati, Ohio, have bought property on Spring Grove avenue and it is reported they will build an immense factory and will probably install a new polishing and plating plant.

The Wright Wire Company, of Palmer, Mass., are making large improvements in their works. These will include new boilers, new engine and a second storage tank capable of holding 90,000 pounds of sulphuric acid.

In one day's mail recently the Millett Core Oven Company, of Brightwood, Mass., received orders for their core oven from London, England; Paris, France; Buenos Aires, Argentine Republic; San Francisco, Cal., and Portland, Ore.

The Detroit Polishers' & Platers' Supply Company, 213 East Atwater street, Detroit, Mich., is the title and address of a new concern dealing in platers' and polishers' supplies. Besides a general line they have several new specialties.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until January 22 for quantities of bronze rod, ingot copper, solder, slab and sheet zinc, brass copper and iron pipe, etc.

Thirty years of experience and 15,000 users is the record of the Otto Gas Engine Works, Philadelphia, Pa., of what they have accomplished with their Otto engines. The engines are particularly suitable for power purposes in metal working establishments.

A record shipment of hardware, forty tons, four carloads, 538 orders, was recently made for the clearing day shipment of the year 1906 by the Yale & Towne Manufacturing Company, of Stamford, Conn. This beat the largest one-day shipment for 1905 by 220 orders.

Stanley Doggett, 101 Beekman street, New York City, a manufacturer of "Perfection" Parting Compound and other foundry supplies, has just laid the foundations for a plant double its present size. He reports a continued increase of the sale of his parting compound.

W. H. Wilmarth & Company, of Attleboro, Mass., will rebuild their jewelry factory, recently destroyed by fire. The old building was 40 x 200 feet. It is probable that, on account of pressure of business, the new structure will not be started until spring.

Albert Furniss, a general die sinker, designer and mold maker of 145 Grove street, Bridgeport, Conn., announces that he is ready at all times to furnish designs from a customer's suggestions, makes models from sketches and make molds for casting white metals.

The Stowell Manufacturing & Foundry Company, of South Milwaukee, Wis., recently increased its capital stock from $2,000,000 to $3,000,000. It is probable that the company, which now has a brass foundry, metal work shop and plating room, will soon erect a new foundry.

Herman R. Boissier, of the Boissier Electric Company, 478-80 Pearl street, New York City, has secured the wet black leading process patented by August Gestner, December 18, 1906. It is proposed to prosecute all others who are selling a wet process similar to the above.

The Kenworthy Engineering Company, of Waterbury, Conn., are building lead and tin dross reducing furnaces of 3, 7 and 12 tons capacity. The firm announce that these furnaces are built of the best material and latest designs and are low in first cost and economical in operation.

We are officially informed that the Winchester Repeating Arms Company, of New Haven, Conn., have had no negotiations looking to the control of the Union Metallic Cartridge Company, of Bridgeport, Conn. We make this correction of the rumor on the authority of both the above mentioned companies.

Alfred Field & Company, 93 Chambers street, New York City, are pushing their "Wax Wire." This is a comparatively new article; wherever it has been used it has been found invaluable as a perfect core vent, especially for brass founders and others who are turning out work requiring intricate and delicate cores.

The Carbon Inclinator Company have moved from 1328 Columbia avenue to 1733 Flora street, Philadelphia, Pa., where they have better facilities for the sale of their inclin-

ators. These inclinators are a useful device which may be attached to a carboy of acid, saving hundreds of dollars in spills.

The Billings & Spencer Company, of Hartford, Conn., will open a Canadian branch for the manufacture of drop forgings and drop forging machinery. The location has not yet been selected. The new concern will be known as the Canadian Billings & Spencer, Ltd., with a capital of $200,000.

The Waterbury Brass Company, of Waterbury, Conn., has taken out municipal permits for the erection of several new additions. The buildings will consist of two casting shops, each 35 by 319 feet, of brick and steel, and a brick storage warehouse 64 by 319 feet. Each building will be one story high.

The Monarch Engineering & Manufacturing Company, of Baltimore, Md., builders of the "Steele-Harvey" metal melting and refining furnace, report that at all times they have on hand unfilled orders and are continually engaged in the construction of different designs of furnaces for different purposes in foundry and smelting practice.

The International Silver Company is making some changes in Factory N, Meriden, Conn. The plating room has been moved to the top floor and the burnishing room and buffing and lacquering room moved down to the second floor. The engraving room will be on the third floor. The change was made to have less handling of the goods.

The Hill & Griffith Company, of Cincinnati, O., manufacturers of foundry supplies and equipment, have lately made sales of their core oven to the Union Embossing Machine Company, of Indianapolis, Ind., and the Albion Malleable Iron Company, of Albion, Mich. The sale of these two ovens makes their total sales over 500, which is an exceedingly good record.

The Du Bois Iron Works, Du Bois, Pa., have purchased the entire business of the Lazier Engine Manufacturing Company, of Buffalo, N. Y. Numerous improvements will be made in the engines, which will be adapted to work with natural, illuminating or coke oven gas, gasoline, alcohol, distillate, crude oil or kerosene. They will be made in sizes from 5 to 300 horsepower.

The Eagle Smelting & Refining Works, of 740 East Fourteenth street, New York, have bought the property adjoining their present quarters. The new building is 50 x 140 feet and will be used for handling and storing metals and increasing their office facilities. This firm has established a new chemical laboratory, as they are large buyers of copper and zinc residues of all kinds.

The American Silver Company, of Bristol, Conn., are adding to their large line of drop presses, having recently bought another Peck Drop Press of the latest model with a 1,200 pound hammer. The Peck Drop Press Works, of New Haven, Conn., have sold their drop presses to about every manufacturer of German silver flatware in the United States and Canada.

John H. H. McNamee and Andrew J. Conlin of Cambridge, Mass., have formed the American Insulated Wire & Cable Manufacturing Company, and intend to manufacture all kinds of insulated wire and cable. They are fitting out a very large plant containing about 70,000 square feet of floor space and will equip with all the machinery necessary for an up-to-date plant.

The Syracuse Smelting Works, of Thirty-sixth street and Tenth avenue, New York City, announce that they have received contract No. 338 from a United States Navy Yard for their S. S. W. shield brand of phosphor tin. The company report large sales of this alloy as well as their other shield brand products, including ingot copper, brass, spelter, babbitts, metals, etc.

The Galton Manufacturing Company, Cleveland, Ohio, was organized last August and are doing considerable business at their factory in Perkins Court. They have secured a number of orders for foundry and factory brushes. The officers of the company are E. F. Streich, president; John H. Galloway, secretary and treasurer. Mr. Streich was with the Osborne Company of Cleveland, for a number of years.

The new factory of the Lavigne Manufacturing Company, of Detroit, Mich., consists of a main building two stories in height, 150 feet long by 50 wide, and a foundry 40 by 50 feet. The company manufacture mechanical force feed oilers for automobiles, which have been adopted by many of the prominent builders. They cast aluminum as well as brass. At the present time they are employing between 75 and 100 hands.

George S. Williams, a practical plater of experience, has established a plating supply agency and has his headquarters in Room 76, Peron Building, Fifth and Race streets, Cincinnati, Ohio. Mr. Williams has formed connections with a number of manufacturers of platers' supplies and with his acquaintance in the plating industry of Cincinnati and vicinity he expects to do a good business.

An interesting announcement is made by the Taunton Crucible Company, Taunton, Mass., in which they say "that as all other crucible manufacturers claim that they make the best crucibles, our modesty and truth compels us to assure all users of crucibles that our crucibles equal any on the market for quality and surpass others in capacity." The company is ready to take contracts for 1907.

The Crucible Department of the Joseph Dixon Crucible Company, Jersey City, N. J., feel very well satisfied that when the salesman from a competing works asked a metal melter how many heats he had made on the pot he had just taken out of the furnace he replied "fifty." The salesman looked at the melter as if "you're a liar," but afterward learned from the boss of the esablishment that it was the truth.

John C. Culbert, Pawtucket, R. I., announces that he is in the market for 250,000 lbs. of red brass washings, 250,000 lbs. of yellow metal washings, 250,000 lbs. red brass grindings, 250,000 lbs. yellow metal grindings, 300,000 lbs. of copper scale, 300,000 lbs. copper wire, 25,000 lbs. new sheet aluminum. He is particularly anxious to get hold of 25,000 to 30,000 lbs. of aluminum sheet. "Spot cash" is the slogan of Mr. Culbert for all of the metals that he buys.

Edward Miller & Co., of Meriden, Conn., have recently moved three frame buildings and are putting up new five-story brick structures to take their place. The increase is for the screw machine department and it is expected the new buildings will be finished by this summer. The plant of this firm has increased in size about one-third in the last six years. They manufacture metal goods, making a specialty of lamps and chandeliers.

The White Mountain Plating Works, of Nashua, N. H., have been purchased by the Tubeless Iron Company and the business moved to Manchester, N. H. The new proprietors have added a complete new outfit, including nickel tanks in which they can handle pieces up to 14 feet in length. The company make a specialty of fine finishes on brass work, oxidizing, lacquering, etc., and particular attention is given to refinishing gas and electric fixtures.

Alfred Fisher, 103 West Monroe street, Chicago, Ill., patentee and manufacturer of the Fisher crucible metal melting furnace, using oil for fuel, reports that he has just received an order from the Mark Manufacturing Company, of Evanston, Ill., for two furnaces and that the Anderson Brass Foundry, of Chicago, Ill., is very much pleased with their first battery of Fisher furnaces and have ordered another to hold a 300 crucible. The W. D. Allen Manufacturing Company, of Chicago, have three of the Fisher furnaces.

The Bates & Peard Patent Annealing Furnace Company, of Liverpool, for whom C. H. Dally, 29 Broadway, New York City, is the representative in this country, have just received a repeat order from the India Office in London for two more double coin type furnaces for the Government mint in India, thereby making four in all that have been ordered during the last sixty days. The New York office has also just received an order for one of their large wire annealing furnaces.

The Hazard, Coates & Bennett Company have moved into their new plant at Rochester, N. Y., located on the New York Central Railroad, and where the company have nine acres of ground and buildings. They have erected a modern smelting plant equipped with the latest appliances for the handling and smelting of metals. They are now in a position to furnish the trade promptly with ingot brass and bronze and all kinds of white metals. Special attention is paid to producing metals according to specifications.

The metal trade at large will regret to learn that E. M. Moer's Sons, of James Slip, New York City, have gone into bankruptcy and that a receiver, E. Sprague, has been appointed to take charge of the firm's affairs. They had been in business since 1854, buying and selling new and old metals, but had recently spent $20,000 in establishing a clock and novelty business, which the management say was one of the principal causes of their failure. The proprietors hope to continue as soon as all of the claims can be adjusted.

Since the production of aluminum in the United States on a commercial scale, the name of the producers has been the Pittsburgh Reduction Company, of Pittsburg, Pa. On January 1, 1907, the name was changed to the Aluminum Company of America, as it was desired to conduct the business under the name which discloses the nature of the business. The stockholders, directors, policy, management, officials, etc., remain the same as heretofore. The change is solely one of the name. The officers of the company are: President, R. B. Mellon; vice-presidents, Charles M. Hall and George H. Clapp; secretary and general manager, Arthur V. Davis.

The Union Smelting & Refining Company, of 606 East Nineteenth street, New York City, claim to be one of the largest white metal manufacturing concerns in the State. They have recently increased their plant to double its former capacity in order to supply their demand. Two large phosphor-tin furnaces have recently been installed. Their process of manufacturing phosphor-tin is such that there is no possible chance for the phosphorus to escape. They state that their various brands of babbitt metal have twice the lasting qualities and are lighter in specific gravity than any other metal on the market at the same price. This company has made rapid strides in the three years of its existence.

The Rockwell Engineering Company, 26 Cortlandt street, New York City, have within the last six months completed the installation of a number of their annealing furnaces, including two at the Rome Brass & Copper Company, Rome, N. Y.; four at the Michigan Copper & Brass Company, Detroit, Mich.; one at the Scovill Manufacturing Company, Waterbury, Conn.; one at the Allis-Chalmers Company, Milwaukee, Wis.; one at the Wagner Electric Manufacturing Company of St. Louis, Mo., and one at the General Electric Company, Schenectady, N. Y. All of the furnaces are either ready for use or being used excepting those at the plants of the Wagner Electric and the Michigan Copper & Brass, upon which the Rockwell Company are now putting the finishing touches. The company have also received several duplicate orders for their Double Chamber Metal Melting Furnace. One recently from McNab & Harlan, Paterson, N. J.

The Goldschmidt Chemical Company, 60 Wall street, New York City, was formed for the purpose of taking over certain chemical processes and patents, other than their well-known thermit processes of Th. Goldschmidt, of Essen-Ruhr, Germany, and of eventually operating in America under them, Dr. Karl Goldschmidt, of that firm, being the president of this company. As soon as a desirable location can be found it is proposed to build and properly equip a plant in America for the purpose of manufacturing. Dr. Franz H. Hirschland is the treasurer and manager of the company; he is a consulting engineer, a graduate of the Universities of Hanover and Berlin. E. Stutz, the vice president, is the head of the Goldschmidt Thermit Company, manufacturers of "thermit," 43 Exchange place, New York City. Hubert E. Rogers, the secretary, is a member of the well-known firm of Creevey & Rogers, lawyers, of New York City. A nominal capital of $5,000 has been paid in in cash; this will be finally increased to meet the needs of a large plant. All the capital required has been assured.

INCORPORATIONS

The Globe Brass Works of Detroit, Mich., has been incorporated with a capital of $70,000.

The American Aluminum Manufacturing Company, of Lemont, Ill., has been incorporated with a capital of $5,000 by George S. Walker, William Dougall and J. L. Gallagher.

The Allyne Brass Foundry Company has been incorporated at Albany, N. Y., with a capital of $50,000. The directors are E. E. Allyne, George C. Miller and Charles A. White.

The Metallizing Art Company, Camden, N. J., has been incorporated with a capital of $5,000 to deal in sheet metal art goods. Incorporators are E. L. Livingston, E. M. Burd and W. H. Packer.

The Binns Chemical Works, Norwalk, Conn., have filed a certificate of incorporation with the Secretary of State. The officers are Charles E. Sholes, president; Welling S. Katzenbach, vice-president; L. M. Taylor, treasurer, and A. W. Martin, secretary. The company have acquired the Norwalk Works of Joseph Binns, and expect to enlarge the plant and extend the variety of products manufactured. The Charles E. Sholes Company, New York City, will have the sale of the output. The latter company have also become the sales agent for the Roberts Chemical Company of Niagara Falls, N. Y., manufacturers of platers' and polishers' supplies.

PRINTED MATTER

SOUVENIR.—The Great Lakes Engineering Works, of Detroit, Mich., have issued a very neat New Year Greeting in the shape of a small folder.

CALENDAR.—John C. Culbert, of Pawtucket, R. I., is issuing a calendar containing the portrait in colors of an oriental beauty and a good record of the months attached.

NAIL PULLER. L. F. Grammes & Sons, Allentown, Pa. This nail puller will handle any nail from a 20 penny to as small as a cigar box nail. It draws the nails straight and sure and they are uninjured.

"THE SILENT PARTNER," issued by the Globe Machine & Stamping Company, of Cleveland, O., is just as good, perhaps better, in the last number than in the previous editions. It is worth sending for.

PARTAMOL. A circular from the S. Obermayer Company, of Cincinnati, O., describes their "Partamol," which is a compound for parting molds in which brass, bronze, ornamental iron and steel are cast.

A neat calendar for the new year has been prepared by Bruce & Cook, of 186-190 Water street and 248-250 Pearl street, New York City. This marks the ninety-fifth year of this firm, which was established in 1812.

A Circular by the Thomas W. Pangborn Company, of New York City, deals with their foundry supplies and equipment. Their sand and clay products are used by some of the leading concerns in the country.

CIRCULAR.—The Union Smelting & Refining Company, 604-608 East Nineteenth street, New York City, have issued a circular, showing what can be saved by using their Iron Age Brand Antifriction Babbitt Metal.

PLATING.—The St. Paul Electro Plating Works, St. Paul, Minn., have prepared a very attractive circular dealing with their facilities for plating of all descriptions. They are practically unlimited in the lines they are prepared to undertake.

"ALBRIGHT." Owen C. Hassler Company, Chicago, Ill. The Hassler Albright is intended for polishing and cleaning all silverware, brass, copper, nickel, German silver, gas fixtures, gold, zinc, iron, steel, etc. It helps everything and harms nothing.

BLOTTER.—Through a mailing blotter the Western Electric Company, of Chicago, Ill., announce that they will be at the Electrical Show, Coliseum, Chicago, January 14 to 26, Booth No. E 21-24. "Let's get acquainted" is one of the sayings on the blotter.

CALENDAR.—We have received from C. W. Leavitt & Company, of 220 Broadway, New York City, importers and agents for foreign ores, metals and alloys for iron, steel and brass works, a very handsome calendar for 1907, which would form a useful and attractive ornament in any office.

UNIVERSAL CLAMPS. Circular. E. E. Josef Manufacturing Company, Buffalo, N. Y. The clamps are intended for molders, carpenters and cabinet and pattern makers. They instantly adjust themselves to any size flask and when in position are entirely free from projecting parts, making it possible to roll the flask without disturbing the fastenings.

TRAPS, COCKS, ETC.—Circulars from the Fowler Brass Works, of 2333-2337 Wabash avenue, Chicago, Ill., mention their traps, cocks, bushings, etc. Their drinking fountain cocks are easy to operate, will not stick or hammer and positively will not drip. These are adopted and used exclusively by the chief engineer of Chicago's school buildings during the year 1906.

ELECTRIC CONTROLLERS. The Type U electric controllers manufactured by the Electric Controller & Supply Company, of Cleveland, O., have been designed to meet a demand for a moderate priced self-contained controller of from 1 to 50 horsepower. They are intended to fulfill the conditions of crane service in industrial plants and in cases where the service is not severe enough to demand the use of the company's well-known Dinkey ventilated controller.

FOUNDRY LADLES.—In this catalogue by the J. W. Paxson Company, of Philadelphia, Pa., a large variety of foundry ladles have been standardized and designated by number. Their dipping and pouring ladles for handling melted white metals are made of one piece of plate steel in capacities of 50 pounds or more. Their babbitt and spelter ladles are made extra strong of plate steel. The handles are long and strong in proportion to the bowl. They are made round with D-shaped end unless ordered flat and straight.

AUTOMOBILE AND MOTOR BOAT CASTINGS.—The William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., have prepared a very useful catalogue of their automobile and motor castings in Parsons' white brass, bronze, phosphor bronze and Parsons' manganese bronze. The engravings show wheel castings with hollow spokes of Parsons' manganese bronze and bronze axles and frames, and a large line of small parts for automobiles. These bronzes are as easily machined as the ordinary commercial bronzes.

METAL MARKET REVIEW

NEW YORK, January 10, 1907.

COPPER.—If high prices are a sign of prosperity then 1906 was a banner year, and 1907, on that basis, bids fair to so far outclass it that 1906 will seem poor, indeed. The year 1907 opens with a 25 cent market for Lake Copper, for actual spot Lake Copper 25 cents is eagerly bid, and it is a question if any Lake Copper for January delivery can be obtained at this price to-day. To go back to our review of a year ago, we said "The domestic copper market at the close of the year (1905) is as strong or stronger than at any other period, and prices have touched the highest point in years." Lake Copper a year ago was selling at 19½ to 20 cents, and to-day the price is 25 cents, and some of the best posted interests in the trade predict 30 cent copper before many months. We have had a tremendous year in copper, and, in fact, in all metals. Taking pig iron as the barometer, or the standard of all metals, it has had the largest production ever known—over 25,000,000 tons for the year—and yet with that record production spot iron has been at a premium of over $5 per ton, and we have had to import thousands of tons. With copper the same conditions have existed; the demand has been greater than the supply, and at present rate of consumption these conditions are likely to prevail through 1907. The price movement in copper in 1906 was slightly irregular for the first three months, but after that the constantly pressing demand forced a steady upward movement in prices which culminated in a new high record of 25 cents for spot copper at the end of the year. Briefly, the copper market opened at 19½ to 20 cents for Lake in January, and with a more or less dull February prices sagged off slightly, and some sellers (interested in bearing the market in order to obtain supplies cheap) made some few sales in the month of March at 18 cents, and the event was dully heralded all over the copper world. Meanwhile the leading interests declined to lower their prices, and a few weeks later events proved their judgment was correct. Sales very shortly after that were made at 18¾, and the market from that time advanced steadily and persistently to 25 cents at the close.

At this time of the year statistics and estimates are in order, and are most carefully conned and worried over and compared with years ago, but what does it all amount to? Absolutely nothing; and in copper especially—since the mines declined to report their outputs—one man's "guess" is just as good, or as bad, as another's, and sometimes it's very much worse. It is impossible to say what the production or consumption is. We know, absolutely, what the exports for the year 1906 were. They were 205,460 tons, and the imports were 106,000 tons, but the production and the consumption is just guess work. The government will come out with their "guess" sometime next June or July when even the deepest "thinkers" are not interested. Of course, if we lived in Japan we would probably have correct figures out by the middle of January—but we don't, and so we have to wait. Meanwhile we will give you what one of our esteemed contemporaries estimates the production of copper for 1906:—915,000,000 pounds; while a well-known authority on copper places the production at 927,900,000 pounds, and yet another authority says the production of copper in 1906 was 440,000 long tons (2,240 lbs.), or 985,600,000 pounds. There we have three "estimates" with a difference of 70,000,000—nearly 6,000,000 pounds a month difference. Of course, you can take your choice, and you will each feel that you are right and the other man wrong. The consumption is estimated on the same lines, and is just about as reliable. We don't know what it was; but, if you are interested, one man "estimates" it was 710,000,000 pounds and the other man is still estimating. The common sense of the whole thing is that prices throughout the year have steadily risen, spot copper has been at a premium the entire period

and, consequently, there can be no surplus stock of copper on hand in America to-day with present prices prevailing.

How long these high prices are going to last is another story, and consumers are hardly likely to contract for any future copper at around present prices except for actual orders in hand. The market for January opens at 25 cents for spot Lake, 24¾ to 25 for Electrolytic and 23¾ to 24 for casting, while futures, say March, April and May, can be bought at about ¼ cent lower.

TIN.—The pig tin market in London during the year has indulged in the usual skyrocket fluctuations, only the rocket in this one instance is still up, and may stay up for some little time, or may not. The London price of spot tin opened at £162 5s. and was pushed up up to £215 in May when the Little Old Lady of Threadneedle street, commonly called the Bank of England, raised the rate of interest one point and the financial markets of the world and all speculative commodities received a bad jolt, and some of them have not even yet fully recovered. There has not been, nor is there to-day, any legitimate basis for the abnormally high prices for pig tin made by the London speculators. The Chinese merchants in Singapore and Penang are a hard crowd to beat and the high prices are paid to these same Chinese merchants; the London operators are the fiddlers, the American consumers pay the money and the Chinese merchants get it. The high prices for pig tin are not legitimate for the reason they are not based on the laws of supply and demand. Let us look into the figures for the year just past. The shipments from the Straits during 1906 were 254 tons larger than the shipments the year before. Now take the total arrivals of tin from all sources during 1906 we have a total of 43,474 tons and the total deliveries for the year were 41,200, while the deliveries in 1905 were only 38,600 tons, so that we have an increase in consumption in 1906 of 2,600 tons; the shipments were 254 tons heavier, so that we have a net increase in consumption of 2,346 tons, but the deliveries during the year from London and Holland were 1,921 tons less in 1906 compared with 1905, so that our increase in consumption is offset by the decrease in London and Holland with a difference of only 400 tons. The visible supply at the end of 1906 was 12,998 tons against 13,451 a year ago, while to-day we have to pay 42 cents per pound against 36 cents a year ago. And we are told by people that ought to know (and probably do) that the advance is legitimate and they will go ahead and prove it to you and if you can't see straight it looks all right.

The New York market has simply followed the tune the London bulls played and the American consumers are the sufferers. While on the tin market it is interesting to note that there is tin in good paying quantities in Alaska and from reliable reports we shall soon have tin from that quarter as a regular supply. We refer to this in another column under Alaska Tin. The price of tin in New York opened last January at 36 cents and closes to-day at 41.50 cents.

LEAD.—The foreign lead market has ruled fairly strong all the year, but does not show an abnormal advance. In London at the end of 1905 lead was quoted at £17 8s. 9d., and to-day the price is £20, an advance of less than £3 per ton.

In the home markets the price of lead throughout the year has been kept sufficiently below the importation price to prevent any foreign lead getting in, and although the foreign market was at times half a cent per pound above our price, the Trust did not always take advantage of it. The Trust price at the close of the year for New York delivery is 6 cents on 50 ton lots for shipment from the West. The Trust carries no spot stock here, so that for quick delivery or spot there is generally a premium of 25 cents. A year ago the Trust price was 5.60, so that the advance in lead has not been proportionate to the other metals.

The production of lead for the year is estimated at 300,000 tons, against 269,600 tons during 1905.

SPELTER.—Here again is another metal that has not shared in the abnormal advances of tin, copper, antimony and iron. Foreign spelter to-day is £1 lower than a year ago, and the fluctuations throughout the year have been very slight. The average price of spelter for the year 1906 was £27, or about £2 above the 1905 average.

The New York market for spelter has ruled fairly steady at from 6.65 in January, 1906, down to 5.75 in the summer, with an average for the year of about 6 cents, against an average of 5.95 for the year previous. The production for the year is estimated at 200,000 tons, against 182,000 tons in 1905. The New York price at the close of the year is 6.75, against 6.65 a year ago. In St. Louis the price as quoted by the St. Louis Exchange is 6.65, but this quotation is more or less artificial, as consumers are generally supplied "delivered terms" at the St. Louis quotations. The market seems to be manipulated by two or three different factions that never seem able to pull together.

ALUMINUM.—The consumption of this metal has increased faster than the production, and at the present time the makers are behind with their deliveries and considerable business has been lost through the scarcity of the metal. The price to-day for ton lots is 41 cents, against 35 cents a year ago. With copper selling at 25 cents there can never be a better opportunity for aluminum wire, but the makers were not able to take advantage of the market, and in fact are not in shape to take care of the ordinary increase in consumption.

ANTIMONY.—This metal has shared in the general expansion of prices, and the year 1906 marks the highest prices paid for antimony during the last 25 years. The reasons given for the advance were scarcity of ores and the increasing consumption, owing to the use of antimony in the manufacture of smokeless powders. The domestic market opened a year ago at 14 cents for Cookson's and 13.75 for Halletts; prices steadily advanced up to 28 cents for Cookson's in May. This marked the high point for the year; from that date prices sagged off again, and to-day Cookson's is quoted at 24.75 and Hallett's at 23.50, a net advance for the year of about 10 cents per pound. The imports of antimony for the year 1906 are estimated at 3,100 tons (December returns not in yet), against 2,526 tons in 1905. The foreign market, of course, started the advance. A year ago Hallett's was quoted in London at £86 5s., and prices ran up to £115 5s. in May, when there was a general let-up of values and the market sagged off to £112 for Hallett's at the close and £108 for other brands. We are at present below the cost of importation, but this difference will soon be eradicated and we shall get down to a normal importing basis again.

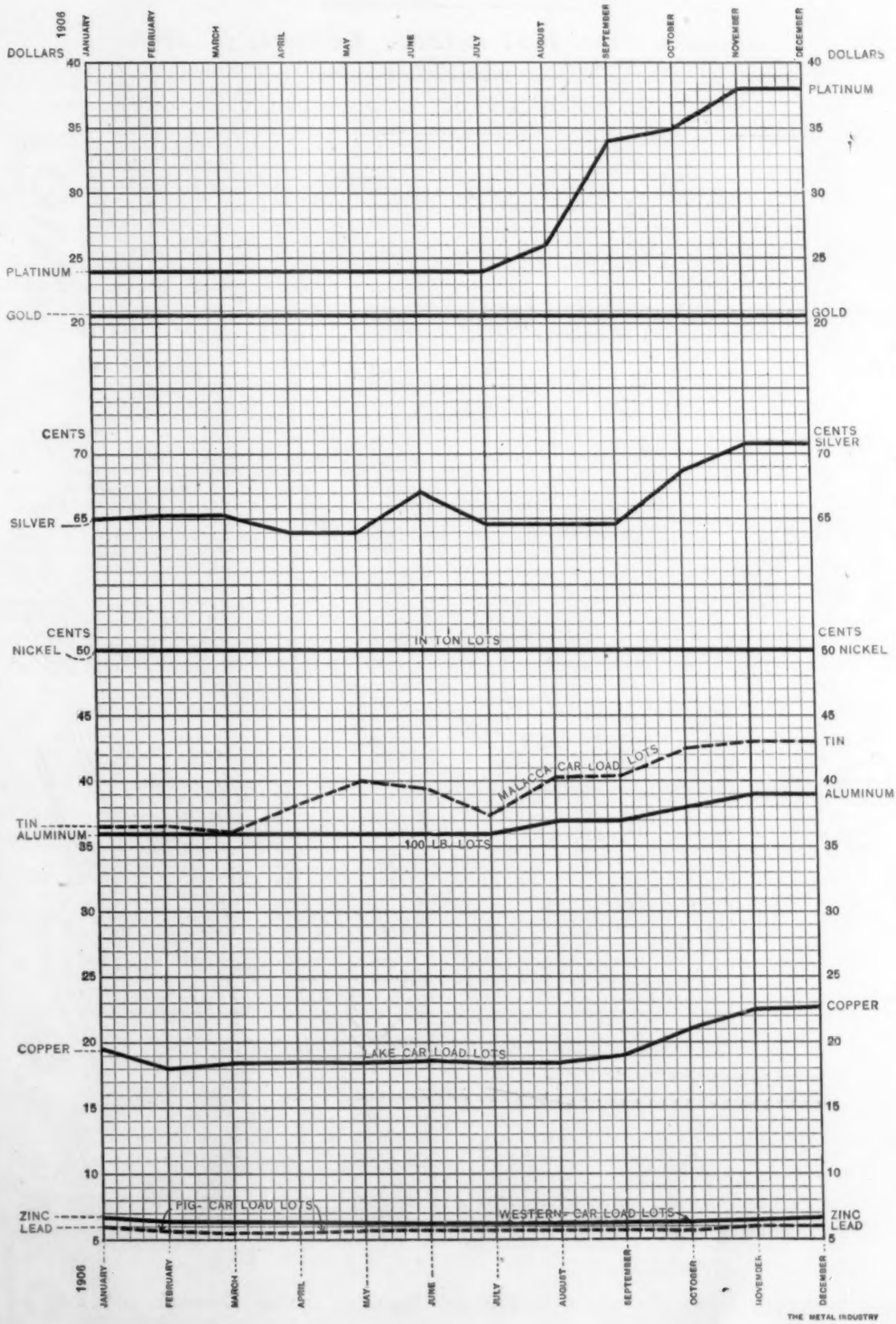
SILVER.—The price of silver has risen considerably during the year, owing possibly to the increased demand from the East and lately the purchases by the home government. The production increased a little over one million ounces, or about the same as the increase last year. The price lately touched 71 cents in New York and 33 1-16d. in London. These prices did not hold very long, and at the close of the year the official price in London was 32 5-16d. and in New York 69⅝ cents, against 29 15-16d. a year ago and 64 cents in New York. It was predicted not very long ago that silver would go to 75 cents, but as the American Government is now a buyer and as this same government has a way of investigating any trusts that don't look just right the Silver Trust may find it politic not to push the price too high.

SHEET METAL.—The demand for sheet copper and brass tubing has been enormous and the mills have been pushed to their utmost to make deliveries. The price of sheet copper has been advancing in sympathy with the advance in ingots. The last advance was on Dec. 20, 1906, when the price was 29 cents base, and if copper continues to advance, sheets will have to be marked up. The price of sheet copper in December, 1905, was 23 cents. The first advance was September 20, 1906, to 24 cents; October 4, advanced to 25 cents; October 10, 27 cents, and December 20, 29 cents, showing a net advance for the year of 6 cents per pound.

OLD METALS.—The year 1906 will be marked as a red-letter year for the old metal trade. The market has been fairly active throughout. Prices of all scrap have steadily and consistently been advancing and the demand has been good, and it has been possible on nearly all purchases to turn them over at a fair profit. Scrap copper to-day is worth 21 to 22 cents per pound, against 16.50 to 17 cents a year ago. Other material shows the same advances. On zinc dross the market to-day is about 5¼ cents in New York.

See Advertising Page 23 for Trade Wants

CHART OF METAL PRICES FOR THE YEAR 1906.



Metal Products of the United States

Calendar Years 1897 to 1905, Estimated for 1906

(From the United States Geological Survey.)

PRODUCTS. METALLIC.	1897. Quantity.	1897. Value.	1898. Quantity.	1898. Value	1899. Quantity.	1899. Value.	Products.
Pig iron (*a*) (spot value *b*), long tons....	9,652,680	$95,122,299	11,773,934	$116,557,000	13,620,703	$245,172,654	Pig iron.
Silver, commercial value (*d*), troy ounces	53,860,000	32,316,000	54,438,000	32,118,400	54,764,500	32,858,700	Silver.
Gold, coining value (*e*), troy ounces.....	2,774,935	57,363,000	3,118,398	64,463,000	3,437,210	71,053,400	Gold.
Copper, value at New York, pounds....	494,078,274	54,080,180	526,512,987	61,865,276	568,666,921	101,222,712	Copper.
Lead (*f*), value at N. Y. City, short tons	212,000	14,885,728	222,000	16,650,000	210,500	18,945,000	Lead.
Zinc, value at N. Y. City, short tons.....	99,980	8,498,300	115,399	10,385,910	129,051	14,840,865	Zinc.
Quicksilver, value at S. F'cisco, flasks....	26,648	993,445	31,092	1,188,627	30,454	1,452,745	Quicksilver.
Aluminum, value at Pittsburg, pounds..	4,000,000	1,500,000	5,200,000	1,716,000	6,500,000	1,716,000	Aluminum.
Antimony (*i*), value S. F'cisco, short tons	3,061	442,300	3,238	532,101	2,861	559,189	Antimony.
Nickel (*j*), value at Philadelphia, pounds	23,707	7,823	11,145	3,956	22,541	8,566	Nickel.
Platinum, value (crude) at New York City, troy ounces	150	900	225	1,913	300	1,800	Platinum.
Total value of metallic products.....	.....	265,209,975	.....	305,482,183	.....	487,831,631	

PRODUCTS. METALLIC.	1900. Quantity.	1900. Value.	1901. Quantity.	1901. Value.	1902. Quantity.	1902. Value.	Products.
Pig iron (*a*) (spot value *b*), long tons..	13,789,242	$259,944,000	15,878,354	$242,174,000	17,821,307	$372,775,000	Pig iron.
Silver, commercial value (*d*), troy ounces	57,647,000	35,741,100	55,214,000	33,128,400	55,500,000	29,415,000	Silver.
Gold, coining value (*e*), troy ounces.....	3,829,897	79,171,000	3,805,500	78,666,700	3,870,000	80,000,000	Gold.
Copper, value at N. Y. City, pounds.....	606,117,166	98,494,039	602,072,519	87,300,515	659,508,644	76,568,954	Copper.
Lead (*f*), value at N. Y. City, short tons.	270,824	23,561,688	270,700	23,280,200	270,000	22,140,000	Lead.
Zinc, value at N. Y. City, short tons.....	123,886	10,654,196	140,822	11,265,760	156,927	14,625,596	Zinc.
Quicksilver, value at S. Francisco, flasks	28,317	1,302,586	29,727	1,382,305	34,291	1,467,848	Quicksilver.
Aluminum, value at Pittsburg, pounds...	7,150,000	1,920,000	7,150,000	2,238,000	7,300,000	2,284,590	Aluminum.
Antimony (*i*), value S. F'cisco short tons.	4,226	837,896	2,639	539,902	3,561	634,506	Antimony.
Nickel (*j*), value at Philadelphia, pounds.	9,715	3,886	6,700	3,551	5,748	2,701	Nickel.
Platinum, value (crude) at New York City, troy ounces.....	400	2,500	1,408	27,526	94	1,814	Platinum.
Total value of metallic products.....	.....	$511,632,891	.....	$480,006,859	.....	$599,916,009	

PRODUCTS METALLIC.	1903. Quantity.	1903. Value.	1904. Quantity.	1904. Value.	1905. Quantity.	1905. Value.	Products.
Pig iron (*a*) (spot value *b*), long tons..	18,009,252	$344,350,000	16,497,033	$233,025,000	22,992,380	$382,450,000	Pig iron.
Silver, commercial value (*d*), troy ounces	54,300,000	29,322,000	55,999,864	32,035,378	56,101,594	34,221,972	Silver.
Gold, coining value (*e*), troy ounces....	3,500,000	73,501,700	3,910,729	80,835,648	4,265,742	88,180,711	Gold.
Copper, value at N. Y. City, pounds....	698,044,517	91,506,006	812,537,267	105,629,845	901,907,843	139,795,716	Copper.
Lead (*f*), value at N. Y. City, short tons.	282,000	23,520,000	307,000	26,402,000	302,000	28,690,000	Lead.
Zinc, value at N. Y. City, short tons....	159,219	16,717,995	186,702	18,670,200	203,849	24,054,182	Zinc.
Quicksilver, value at San Francisco, flasks	35,620	1,544,934	34,570	1,503,795	30,451	1,103,120	Quicksilver.
Aluminum, value at Pittsburg, pounds..	7,500,000	2,284,900	(*h*)8,600,000	2,477,000	(*h*) 11,347,000	3,246,300	Aluminum.
Antimony (*i*), value S. F'risco, short tons	3,128	548,433	3,057	505,524	3,240	705,787	Antimony.
Nickel (*j*), value at Philadelphia, pounds	114,200	45,900	24,000	11,400	.....	(*t*)	Nickel.
Platinum, value (crude) at New York City, troy ounces.....	110	2,080	200	4,160	318	5,320	Platinum.
Total value of metallic products.....	.....	$583,433,948	.....	$501,099,950	.....	$702,453,108	

FROM THE *ENGINEERING AND MINING JOURNAL.*

PRODUCTS. METALLIC.	1906. Quantity.	1906. Value.	
Pig iron (*a*) (spot value *b*), long tons.....	25,521,911	$490,275,910	Pig iron.
Silver, commercial value (*d*), troy ounces.....	57,358,267	38,301,160	Silver.
Gold, coining value (*e*), troy ounces.....	4,702,235	97,155,201	Gold.
Copper, value at New York City, pounds.....	915,000,000	178,699,500	Copper.
Lead (*f*), value at New York City, short tons.....	364,336	38,962,092	Lead.
Zinc, value at New York City, short tons.....	225,395	27,939,964	Zinc.
Quicksilver, value at San Francisco, flasks.....	27,276	1,063,764	Quicksilver.
Aluminum, value at Pittsburg, pounds.....	14,350,000	5,166,000	Aluminum.
Total value of metallic products.....	.....	$877,563,491	

Annual Statistical Report of the New York Metal Exchange, giving Domestic and Foreign Metal Markets.

For Sale at The Metal Industry Office, 61 Beekman Street, New York. Send for particulars.

Metal Prices, January 14, 1907

METALS.	Price per lb.
COPPER, PIG, BAR AND INGOT AND OLD COPPER.	
Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	$25.50
Electrolytic, car load lots	25.25
Casting, car load lots	24.50
TIN—Duty Free.	
Straits of Malacca, car load lots	41.40
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig lead, car load lots	6.25
SPELTER—Duty 1½c. per lb.	
Western car load lots	6.85
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	41.00
100 lb. lots	39.00
Ton lots	38.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons, cask lots	25.75
Hallets, cask lots	24.50
Other, cask lots	23.50
NICKEL—Duty 6c. per lb.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.50 to .60
MANGANESE—Duty 20%	.70
MAGNESIUM—Duty Free	$1.50 to $1.60
BISMUTH—Duty Free	1.50 to 1.55
CADMIUM—Duty Free	1.55 to 1.60
	Price per oz.
GOLD—Duty Free	$20.67
SILVER—Duty Free	68⅜
PLATINUM—Duty Free	38.00
QUICKSILVER—Duty 7c. per lb. Price per flask	42.00

OLD METALS.	Price per lb.	
Heavy Cut Copper	21.00	22.00
Copper Wire	20.00	21.00
Light Copper	19.00	20.00
Heavy Mach. Comp	19.00	20.00
Heavy Brass	15.00	15.50
Light Brass	12.25	12.75
No. 1 Yellow Brass Turnings	14.00	15.00
No. 1 Comp. Turnings	16.00	17.00
Heavy Lead	5.50	6.00
Zinc Scrap	5.90	5.00
Scrap Aluminum, sheet, pure	30.00	32.00
Scrap Aluminum, cast, alloyed	25.00	27.00
Scrap Aluminum, turnings	10.00	13.00
Old Nickel, solid	18.00	25.00
No. 1 Pewter	31.00	32.00

	Price per lb.
SILICON COPPER, according to quantity	.37 to .40
PHOSPHOR COPPER, 5%	.26 to .28
Phosphor Tin	.47 to .48
Brass Ingot, Yellow	.15 to .17
Brass Ingot, Red	.19 to .22
Bronze Ingot	.17 to .21
Manganese Bronze	.20 to .22
Phosphor Bronze	.22 to .26

ZINC—Duty, sheet, 2c. per lb.	Price per lb.
600 lb. casks	8.60
Open casks	9.00

PHOSPHORUS—Duty 18c. per lb.	
According to quantity	.37 to .50

PRICES OF SHEET COPPER.

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb. sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	29	29	29	29	29	30
	Longer than 72 ins. Not longer than 96 ins.	29	29	29	29	29	30
	Longer than 96 ins.	29	29	29	29	29	31
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	29	29	29	29	29	31
	Longer than 72 ins. Not longer than 96 ins.	29	29	29	29	29	31
	Longer than 96 ins. Not longer than 120 ins.	29	29	29	29	30	32
	Longer than 120 ins.	29	29	29	30	31	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	29	29	29	30	31	33
	Longer than 72 ins. Not longer than 96 ins.	29	29	29	30	32	34
	Longer than 96 ins. Not longer than 120 ins.	29	29	29	31	33	37
	Longer than 120 ins.	29	29	30	32	35	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	29	29	29	30	32	35
	Longer than 72 ins. Not longer than 96 ins.	29	29	29	31	33	38
	Longer than 96 ins. Not longer than 120 ins.	29	29	30	32	35	
	Longer than 120 ins.	30	30	31	33	37	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	29	29	30	32	37	
	Longer than 96 ins. Not longer than 120 ins.	29	29	31	34	39	
	Longer than 120 ins.	30	30	32	37		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	30	30	32	35		
	Longer than 96 ins. Not longer than 120 ins.	31	31	33	36		
	Longer than 120 ins.	32	32	34	38		
Wider than 108 ins.	Not longer than 132 ins.	33	33	35			
	Longer than 132 ins.	34	34	37			

Rolled Round Copper, ⅜ inch diameter or over, 20 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 3½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, January 14, 1907

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb.....33c.
12 oz. and up to 14 oz. to square foot, per lb.....34c.
10 oz. and up to 12 oz.....36c.
Lighter than 10 oz.....39c.
Circle less than 8 in. dia., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS.

Prices are for 100 lbs. or more of Sheet Metal in one order

Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive...	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from list 4 per cent for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, net list.

PRICE LIST FOR BRASS AND COPPER WIRE.

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass.	Low Brass.	Gilding Bronze and Copper.
All Nos. to No. 10. Inc.....	$0.23	$0.27	$0.28
Above No. 10 to No. 16.....	.23½	.27½	.28½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount from list, brass, 1 per cent; gilding, bronze and copper, net list, for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, discount brass, net list; net list, gilding, bronze and copper.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in. O. D. Nos. 4 to 18 Stubs Gauge, 26c. per lb.
Seamless Copper Tubing, 31c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb..	34	33	28	27	26	26	26	20	26	26	26	27	28	30	32	33

BRAZED BRASS TUBING.

Brown & Sharpe's Gauge the Standard.

						Per lb.
Plain Round Tube,	¾	in. up to	2	in., to No. 13, inc		$0.35
" " "	⅞	" "	¾	" " 19, "		.36
" " "	1	" "	⅞	" " 19, "		.38
" " "	1⅛	" "	1	" " 19, "		.41
" " "	1¼	" "	1⅛	" " 19, "		.48
" " "	1½	" "	1¼	" " 19, "		.65
" " "	1¾	" "	1½	" " 19, "		1.00
" " "	1⅞	" "	1¾	" " 19, "		1.50
Smaller than ¾ inch						Special
2 inch to 3 inch, to No. 19, inclusive						.38
3 inch						.40
Over 3 inch to 3½ inch						.45
Over 3½ inch						.50

Bronze and copper advance 3 cents. Discount from list 18 per cent for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, discount 14 per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	*3in. 12in. in coils.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.	Cutting to Length.	Polishing or Satin Finishing one Side.
No. 13 and heavier..	47	47	49	49	49	49	52	52	52	1	2
" 14.....	47	47	49	49	49	49	52	52	52	1	2
" 15.....	47	47	49	49	49	49	52	52	52	1	2
" 16.....	47	47	49	49	49	49	52	52	52	1	2
" 17.....	47	47	49	49	49	49	52	52	52	1	3
" 18.....	47	47	49	49	49	49	52	52	55	1	3
" 19.....	47	47	49	49	49	49	52	53	56	1	4
" 20.....	47	49	49	49	49	51	54	55	57	1	4
" 21.....	47	51	51	51	51	53	56	57	63	2	5
" 22.....	47	51	51	51	53	53	56	60	64	2	5
" 23.....	47	51	51	51	53	53	56	62	65	2	6
" 24.....	47	51	53	55	55	55	58	64	67	2	6
" 25.....	49	52	54	56	56	56	59	66	70	2	7
" 26.....	49	52	55	59	59	59	64	68	74	2	8
" 27.....	49	53	57	61	61	62	67	71	77	2	10
" 28.....	49	53	59	61	62	62	69	75	80	2	11
" 29.....	51	54	61	63	65	65	74	80	85	2	13
" 30.....	51	55	63	65	69	75	82	85	90	2	15
" 31.....	56	60	68	71	76	84	87	90	96	3	17
" 32.....	58	62	70	74	82	90	97	103	108	3	19
" 33.....	60	64	73	78	86	97	104	113	123	3	21
" 34.....	63	68	75	83	91	104	116	123	133	3	25
" 35.....	..	78	83	93	103	113	128	138	..	..	..
" 36.....	..	93	103	113	128	133	148	..	..	..	..
" 37.....	..	117	121	142	157	172	187	..	..	..	..
" 38.....	..	137	152	167	182	197	217	..	..	..	..
" 39.....	..	157	177	197	217	237	..	..	..	..	..
" 40.....	..	187	217	237	257	..	..	..	..	..	..

*Polished or scratch brushed 2 sides, double above prices.

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICES LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

Stubs' G.	¼"	⅜"	½"	⅝"	¾"	1"	1½"	2"	2½"	2¾"
4 to 11....	..	..	96	86	83	77	67	61	61	61
12.....	..	1.08	96	86	83	77	67	61	61	61
13.....	..	1.08	96	86	83	77	67	64	64	64
14.....	..	1.08	96	86	83	77	67	64	64	64
15.....	..	1.12	96	89	86	80	70	67	67	67
16.....	..	1.15	99	93	89	83	70	70	70	70
17	..	1.18	1.02	96	93	86	73	73	73	73
18.....	1.85	1.24	1.05	99	93	86	77	77	77	80
19.....	1.88	1.28	1.08	1.02	99	93	83	80	80	83
20.....	1.95	1.31	1.15	1.08	1.05	99	89	86	86	89
21.....	2.01	1.37	1.21	1.15	1.12	1.05	90	93	93	96
22.....	2.17	1.44	1.24	1.18	1.15	1.08	1.05	99	1.05	1.05
23.....	2.33	1.50	1.31	1.24	1.21	1.15	1.15	1.08	1.15	1.15
24.....	2.48	1.60	1.37	1.31	1.28	1.18	1.21	1.21	1.24	..
25.....	2.65	1.69	1.47	1.37	1.34	1.28	1.34	..	..	..

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	43	43½	43½	44	44½	45	45½	46	47	48	49	52	57

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12.....	$0.52	16.....	$0.58
13.....	.53	17.....	.59
14.....	.54	18.....	.60
15.....	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 35 per cent.

Munts or Yellow Metal Sheathing (14" x 48").....21c. lb. net base.
" " " Rectangular Sheets other than Sheathing .....23c. " " "
" " " Rod .....22c. " " "
Tobin Bronze Rod.....24c. " " "
Above are for 100 lbs. or more in one order.

TAYLOR CRUCIBLES

For Years the Recognized Standard for Uniform Service

IF INTERESTED WRITE US

ROBERT J. TAYLOR, INCORPORATED

1900 to 1916 Callowhill Street *PHILADELPHIA, PA.*

CRUCIBLES

¶ All kinds, and for all purposes We make but one quality, "The Best." If you are using an Oil Furnace, it will be dollars in your pocket to give our Special Oil Pot a trial. They have a good reputation.

R. B. SEIDEL, Inc.

Philadelphia Black Lead Crucible Works,

1322-34 Callowhill Street, PHILADELPHIA

FLUOR SPAR

We are the largest mine owners in the world. We make any and every alloy and metal required. Ferro Alloys, Metals and Ores.

Geo. G. Blackwell, Sons & Co., Limited

THE ALBANY, LIVERPOOL, ENG.

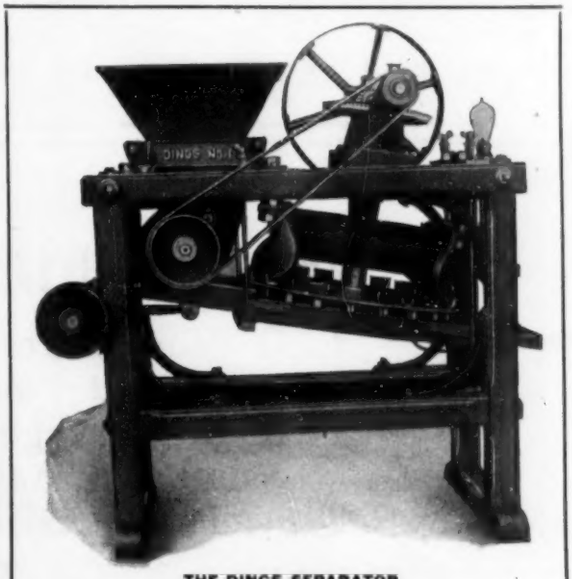
Manufacturers, Metallurgists, Mine Owners, Merchants

WORKS: Garston Docks. CODES: A. B. C., Moreing & Neal, Lieber's, and Western Union

Agents in the U. S. A. for our FLUOR SPAR—The Pennsylvania Salt Mfg. Company, Pittsburgh, Pa.
CHROME ORE—The Harbison-Walker Company, Pittsburgh, Pa.

Founded 1869 by Geo. G. Blackwell

MAGNETIC SEPARATORS



THE DINGS SEPARATOR

DIFFERENT KINDS AND SIZES MADE TO SUIT ANY REQUIREMENTS

DINGS ELECTRO-MAGNETIC SEPARATOR CO. **MILWAUKEE, WIS.**

Annealing Without Oxidation by Automatic Machines

BATES & PEARD ANNEALING FURNACE CO.

C. M. DALLY, Agent, 29 Broadway, N. Y.

NO PICKLING **Large Saving in Labor and Fuel**

NO SCALE Illustrated Catalogue Sent on Application.

Magnetic Separators

for removing Iron from Brass, Bronze, Babbit metal chips, Emery dust, etc. A postal will bring reduced price-list. Sold by J. W. Paxson Co., Philadelphia, Pa.

CHAS. T. BURLIN

Whitinsville. Mass.

WAX WIRE

of the **LION BRAND** supplied by us is superior to all others, and invaluable for delicate and intricate core work. It leaves the vent hole free and unobstructed. Sizes from 1 m.m. to 12 m.m. The former costs about 5c. for 100 lineal feet. The larger sizes proportionately inexpensive. Perfectly flexible under all temperatures. In coils of one pound each continuous lengths.

Samples sufficient for practical test, free of charge on application

ALFRED FIELD & CO., **93 CHAMBERS STREET NEW YORK CITY**

OTTO ENGINES

THE NEW YEAR

OTTO

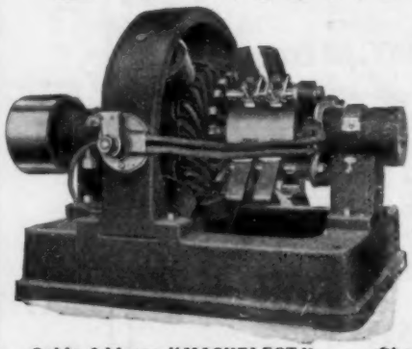
May be made more prosperous by installing the right kind of a power plant. "Otto" Engines are at once dependable and economical. Our thirty years of experience insures it; our reputation as high grade Manufacturers guarantees it, and the testimony of fifteen thousand satisfied users proves it. Engines and Gas Producers are our only product, and our entire stock of energy and gray matter is expended in making them good.

OTTO

OTTO GAS ENGINE WORKS, Phila, Pa.

STANDARD OF THE WORLD

DYNAMOS



For Electro-Plating, Galvanizing and all other low voltage work.

50-8000 Amperes, 3-30 Volts.

Shunt, compound and separately excited.

Catalog on request

CHAS. J. BOGUE ELECTRIC CO.
213 Centre Street
NEW YORK CITY

Cable Address "MACHELECT" Phone, 2111 Spring

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If you have a growing manufacturing business that you would consider moving into a new up-to-date plant of about 20,000-feet floor space, and need more capital for the business, address FACTORY, THE METAL INDUSTRY.

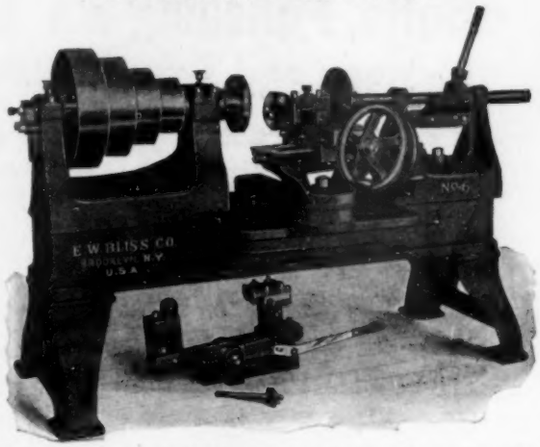
DAILY METAL PRICES

A NEW feature of THE METAL INDUSTRY is accurate daily metal prices. We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the **Official Daily Metal Market Report** of the Exchange and offer this daily price list and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the **Report** alone is $10, the amount usually charged for daily metal quotations. The prices printed in the **Daily Report** can be relied upon for accuracy and fairness. Subscriptions should be sent direct to THE METAL INDUSTRY. Sample copies sent on request and every subscriber will get a copy of the **Exchange Annual Review,** giving valuable statistics about metals.

THE METAL INDUSTRY

61 BEEKMAN STREET NEW YORK

"BLISS"
SPINNING LATHES



are for spinning, burnishing, trimming and wiring the work produced in drawing presses. The lathes are built in the most substantial and careful manner, with hammered steel spindles, bronze metal-boxes and heavy compound slide rests. They are supplied either right or left-handed and for either outside or inside spinning. The hardened steel burnishing roll is provided with anti-friction bearings to prevent heating. Made in several sizes.

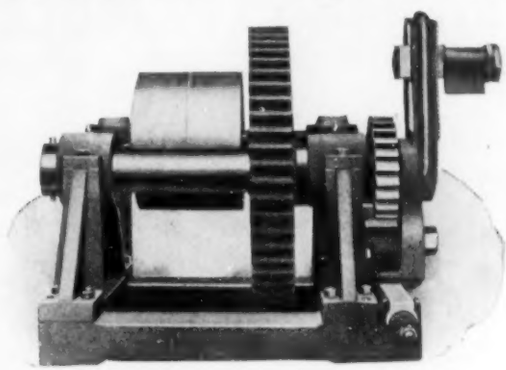
PRESSES FOR EVERY PURPOSE.

E. W. BLISS CO.

23 ADAMS STREET, BROOKLYN, N.Y., U.S.A.

European Office—Clichy pres Paris, France. Agents for Chicago and vicinity—Stiles-Morse Co., 138 Jackson Boulevard, Chicago, Ill.

The PECK
Automatic Drop Lifter



Can be readily applied to any drop, and while it increases your output, decreases your pay roll.

We manufacture DROP PRESSES for all purposes and are Specialists in that line.

THE PECK DROP PRESS WORKS

MINER & PECK MFG. CO., Proprietors

425 Chapel St. NEW HAVEN, CONN.

The TORRINGTON MANUFACTURING CO.

TORRINGTON, CONN.

Finishing Machinery for Brass and Copper Mills to Order.

- Acid Cleaning, Steam and Sawdust Drying-out Machines.
- Power Presses, Single and Double Action Cam or Crank.
- Flattening, Straightening and Overhauling Machinery.
- Machines for Brass and Nickel Plating by Barrel Method.
- Slitters, Scrap Cutters and Coilers, in a variety of Styles and Sizes.
- Channel Iron Mill Trucks to suit any Requirements.
- Metal Saws and Power Shears.

SPECIAL MACHINERY AND TOOLS OF ANY DESCRIPTION

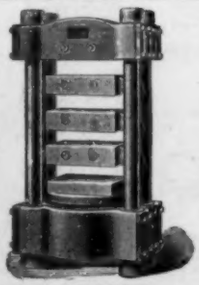
ROLLS
FOR
Steel, Iron, Brass, Copper and Rubber Works

PHILADELPHIA ROLL & MACHINE COMPANY

23d Street and Washington Avenue, Philadelphia, Pa.

New England Representatives: HARRINGTON, ROBINSON & CO. 272 Franklin Street Boston, Mass.

Cable Address: "PHILROLLCO., PHILADELPHIA" Long Distance and Local Phone LOCUST 825



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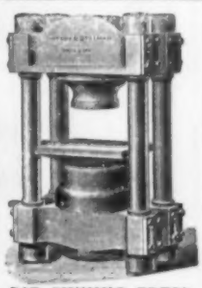
The WATSON-STILLMAN CO., 26 Cortlandt Street NEW YORK

MANUFACTURERS OF ALL KINDS OF

HYDRAULIC

Presses, Pumps, Accumulators, Lifting Jacks, Punches, Shears, Valves, Gauges, Fittings, &c., &c.



DIE SINKING PRESS

For Index of Advertisements See Pages 30-31

The GLOBE Improved TILTING TUMBLER

Tumbles things wet or dry, easy or hard—and in short order. Details in the catalog. Want it? Hundreds of users testify to their good qualities.

Made in six sizes, enough for every purpose

THE GLOBE MACHINE AND STAMPING CO.

976 Hamilton Avenue, Cleveland, O.

English Agents

J. W. JACKMAN & CO., Caxton House, Westminster, London

Endless Polishing Belts, Polishing Machinery and Supplies

¶ There are two features of our new catalog — ENDLESS BELTS and BELT POLISHING MACHINES. The latter includes 20 or more Belt Sanding and Polishing Machines. Write for a copy at once.

L. H. GILMER & CO.
PHILADELPHIA

Dumping Position.

Operation of BAIRD TILTING TUMBLERS is VISIBLE, not BLIND

Two size machines, No. 1 and No. 2, will take Barrels of all kinds up to 36 in. diameter.

New Catalogue "C" tells all.

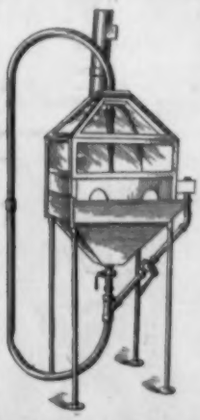
BAIRD TUMBLERS

are quick and easy to operate, built STRONG to withstand rough usage and will run in either position shown in cuts or at any intermediate elevation.

WRITE NOW

THE BAIRD MACHINE CO., Oakville, Conn., U. S. A.

Elevated Position.



SIPPEL PATENT SAND BLAST

PATENTED SEPT. 16, 1902.

For cleanliness, perfect work and rapidity of action it is without an equal. A trial will cost nothing.

References from leading Jewelers and Brass Finishers will be furnished upon request.

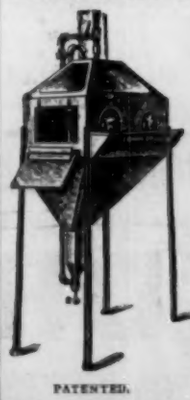
Correspondence solicited, and all information cheerfully furnished. For full particulars and price address

THEO. A. SIPPEL

Patentee and Sole Manufacturer

205 McWhorter Street, Newark, N. J.

LEIMAN'S NEW SAND BLAST



PATENTED.

SIMPLE, EFFECTIVE, ECONOMICAL.

NEW FEATURES—Let us tel you about them.

RESULTS—Let us show you samples of work done.

IMPROVED HIGH PRESSURE BLOWER

NOISELESS. INEXPENSIVE.

Delivers Greater Volume at Higher Pressure Than Any Other Made.

PATENTED.

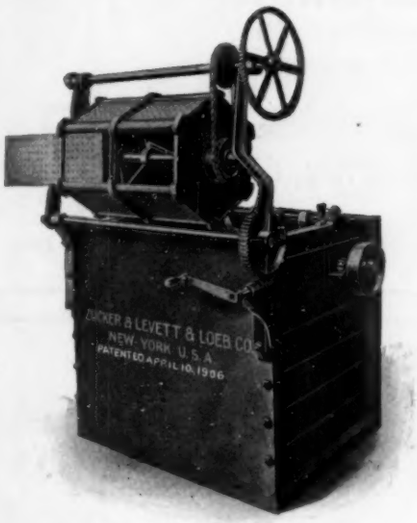
LEIMAN BROS.

Jewelers', Silversmiths' and Metal Workers' Machinery, Tools and WORK BENCHES

139 Centre Street NEW YORK

FOR INDEX OF ADVERTISEMENTS SEE PAGE 31

Our New Patent Revolving Plating Apparatus for Automatic Plating in Nickel, Copper, Zinc, Brass or Bronze Solutions



Apparatus Ready to Receive or Discharge Work.

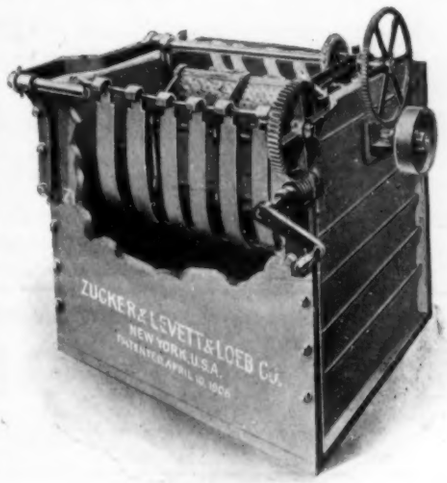
This apparatus consists of a wooden tank 32 x 32 x 36 with a revolving wooden hexagonal cylinder.

The rotation of the cylinder polishes the work and it comes out bright and does not require buffing. A feature of the apparatus is the crank and gear by which the cylinder is readily raised and lowered in the solution.

The apparatus is sold with or without solution or anodes, Solution required, 120 gallons.

We manufacture curved anodes with cast hook to insure good working. 12 are used in each tank.

For further particulars and net prices apply to



Apparatus in Working Position.

Zucker & Levett & Loeb Company

Sole Manufacturers **New York, U. S. A.**

SOMETHING NEW FOR THE BUFFING, POLISHING AND GRINDING ROOM

Patent Separator

V. & L. Patent Separator, Hood and Metal Saving Device

HUNDREDS OF THEM IN USE. WHY NOT BE UP-TO-DATE?

This Separator is constructed to separate the line and dust from the air. Also can be placed next to the fan and collects material in bottom.

VENDERBUSH & LOOMAN

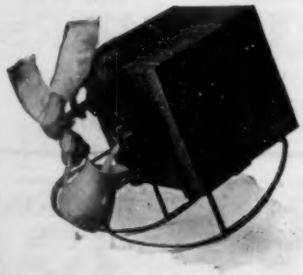
177 LARNED ST., WEST, DETROIT, MICH., U.S.A.

Patent Hood and Metal Saving Device

Save Money

The hood and metal saving device for polishing or grinding wheels can be attached easily to machine and saves from 5 to 20 lbs. of metal per day.

PLATERS! METAL WORKERS!



¶ Invest $5 in this Inclinator and save Hundreds of Dollars in Acid Spills. Put on or taken off in a jiffy.

One Does for All Your Carboys — Sent on Approval

CARBOY INCLINATOR CO.

1733 Flora Street, PHILADELPHIA, PA.

"CRISTOLINE"

Applied to any bright metal surface will prevent Tarnish and Corrosion.

Use on Engines, Machinery, Guns, Tools, or Plated Ware, or Goods for Exhibition.

Successfully used on Automobiles, Bicycles or Carriages, both on the metal or varnished parts.

Invisible, waterproof, easily applied.

Dealers, or large sample by mail for 30 cents.

CHAS. A. G. WINTHER

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The "Nikolas" Lacquers

Are the only ones that have always been of a good uniform quality. We SAVE you trade, worry and money

G. J. NIKOLAS & CO.

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CUT THIS OUT

AND MAIL IT TO-DAY

FREE LACQUER SAMPLES

City_____, February,____1907

M. L. BARRETT & CO.,
219 Lake St., Chicago, Ill.

Gentlemen:—Kindly send us, prepaid, a working sample of and quote us your very best price on a Lacquer to be used on

_____

_____

color_____ to be_____
BRUSHED OR DIPPED

Name_____

Address_____

N. B.—Our Lacquers are the best. If better Lacquers could be made, we would make them. We manufacture the largest Lacquer line in the United States. We make Lacquers for Polished Brass and Metal Work, Oxidized Copper Work, and for nearly every known purpose.

CLEANS and POLISHES

All Silverware, Brass, Copper, Gold, Nickel, Zinc, Tin and Enamelware, Glassware, Gas Fixtures, Marblework, Floors, Woodwork, Tile, Onyx, Wall Decorations, etc. :: Non-inflamable

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spent in reading this advertisement may save you

Thousands of Dollars

If you do Painting, Japanning, Lacquering, Enameling, Bronzing, Glazing, Blending, etc., etc.

THE EUREKA AIR BRUSH or SPRAYER

does this in cases like yours. If interested, describe your work and material, number of operators, etc.

Eureka Air Compressors, Also

EUREKA PNEUMATIC SPRAY CO.

Centre and Chambers Sts., New York

IMPORTED STONE WARE

Superior to anything domestic. For metal and chemical plants. Absolute proof of this statement. Largest stock in America of any importing house.

FREDERICK BERTUCH & CO.

TEMPLE COURT BUILDING *NEW YORK*

When Through Experimenting Use

NEW ERA LACQUERS

NEW ERA LUSTRE CO.
LACQUER MAKERS
NEW HAVEN : : : CONN.

National Sheet Metal Company
Manufacturers of

PLATED SHEET METALS

Nickelzinc, Brasszinc, Copperzinc, Bronzezinc, Nickeltin, Brasstin, Coppertin, Bronzetin

Sheet Zinc, polished and unpolished, for stamping

Large saving to manufacturers. For further information address office, Peru, Illinois

Last Year's Sales, 1,000,000 Pounds

FRENCH LACQUERS AND MIXTIONS

Maigre and Grasse

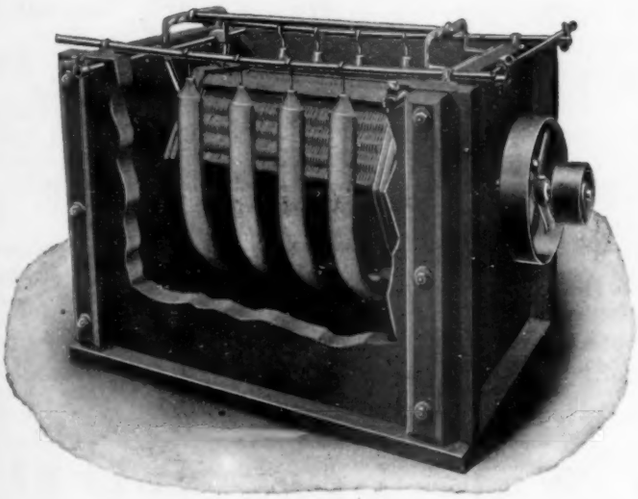
Also acid oxidizing liquids. French sanguines, colors and bronzes especially adapted for the metal trades.

Verde Antique Colors a Specialty

TOCH PAINT SUPPLY CO.

472 West Broadway **New York City**

Mechanical Electro-Plating Apparatus



PATENTED JUNE 22, 1897, FEBRUARY 24, 1903, OCTOBER 11, 1904. OTHER PATENTS PENDING.

The most efficient plating apparatus in the market. Over 400 in use by the trade.

We will furnish sample lots of work without charge.

This apparatus is a proved money saver where small work is to be plated. Can be used in Nickel, Copper, Brass, Zinc and Silver Solutions.

No Stringing. No Wire Used.
No Metal Plating Trays or Baskets.
No Unstringing. No Loss of Metal.
Capacity: 50 lbs. to 500 lbs., according to size.

Basket can be removed at will—without interfering with drive. In larger sizes basket is raised and lowered automatically.

Useful for plating.

Bolts, Nuts, Rivets, Screws, Buckles, Ferrules, Typewriter and Sewing Machine Parts, Lamp Fixtures, Saddlery and Trunk Hardware, Carriage Trimmings, Screw Tops, Shells, Stove Fittings, Locks, Keys and small work.

Write for Catalogue and Prices.

THE HANSON & VAN WINKLE COMPANY

Manufacturers of Dynamos from 50 to 5,000 Ampere Capacity, and all Supplies for Electro-deposition

MAIN OFFICE AND FACTORY
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BRANCHES
30-32 South Canal St., Chicago, Ill., U. S. A.

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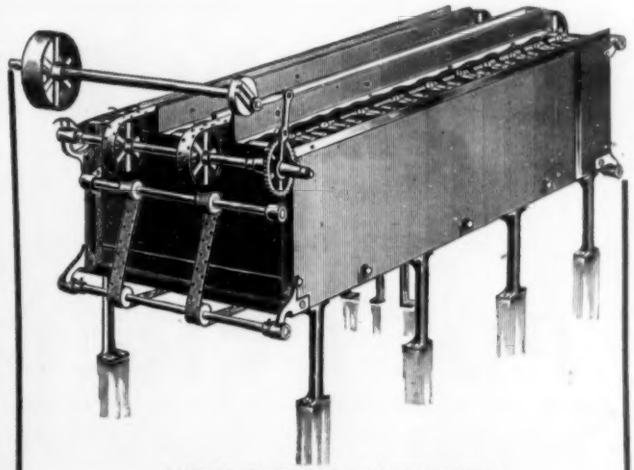

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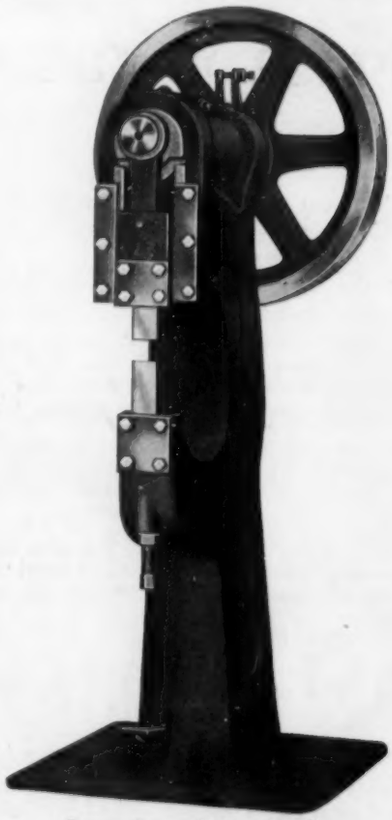

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